USE OF NVIVO 10® SOFTWARE IN CONCEPT ANALYSIS STUDY

Luana Tonin[1, 2]
Maria Ribeiro Lacerda[3]
Marcos Antônio Gomes Brandão[4]
Jaqueline Dias do Nascimento[3]
Jackeline Félix de Souza[5]
Hector Rosso[6]
Cândida Caniçali Primo[7]

[1]Universidade Positivo, Departamento de Enfermagem. Curitiba, Paraná, Brasil.
[2]Secretaria Municipal de Saúde. Curitiba, Paraná, Brasil.
[3]Universidade Federal do Paraná, Programa de Pós-Graduação em Enfermagem. Curitiba, Paraná, Brasil.
[4]Universidade Federal do Rio de Janeiro, Escola de Enfermagem Anna Nery, Programa de Pós-Graduação em Enfermagem. Rio de Janeiro, Rio de Janeiro, Brasil.
[5]Universidade Federal de Rondônia, Departamento de Enfermagem. Porto Velho, Rondônia, Brasil.
[6]Watson Caring Science Institute. Boulder, Colorado, USA
[7]Universidade Federal do Espírito Santo, Programa de Pós-Graduação em Enfermagem. Vitória, Espírito Santo, Brasil.

ABSTRACT

Objective: to discuss the use of software in concept analysis through: 1) considerations made by peers who apply the package in their nursing practices; 2) correlation between the use of the NVivo 10® software and the stages of concept analysis using the Walker & Avant method.

Method: this is a theoretical-reflective essay, based on the stages of concept analysis by Walker and Avant, constructed after a bibliographic survey and discussion with peers who apply the methodological framework and data analysis software in their practices.

Results: in the results, the stages of the preparation and coding process of the support software are described from the concept analysis. A table is presented with the demonstration, description and understanding of the stages of the methodological reference in the use of the auxiliary software.

Conclusion: the use of a concept analysis program can facilitate the organization, visualization and access to research data. Although it does not replace the investigator's work and the relevance of the framework for analysis, it can allow for maximization of process results with benefits for analytical research.

DESCRIPTORS: Software. Data analysis. Concept Formation. Nursing. Research.

USO DO *SOFTWARE* NVIVO 10® EM ESTUDO DE ANÁLISE DE CONCEITO

RESUMO

Objetivo: discutir sobre o uso de *software* na análise de conceito por meio de: 1) ponderações realizadas pelos pares que aplicam o programa em suas práticas na Enfermagem; 2) correlação do uso do *software* NVivo 10® com as etapas da análise de conceito pelo método de Walker & Avant.
Método: trata-se de um ensaio teórico-reflexivo, fundamentado nas etapas da análise de conceito de Walker e Avant, construído após levantamento bibliográfico e discussão com pares que aplicam o referencial metodológico e *software* de análise de dados em suas práticas.
Resultados: nos resultados, são descritas as etapas do processo de preparo e codificação do *software* de apoio a partir da análise de conceito. É apresentado um quadro com a demonstração, descrição e compreensão das etapas do referencial metodológico no uso do *software* de auxílio.
Conclusão: o uso de programa na análise de conceito pode facilitar na organização, visualização e acesso aos dados da investigação. Embora não substitua o trabalho do investigador e a relevância do referencial para análise, pode permitir a maximização dos resultados do processo com benefícios para a pesquisa analítica.

DESCRITORES: Software. Análise de dados. Formação de conceito. Enfermagem. Pesquisa.

USO DEL SOFTWARE NVIVO 10® EN EL ESTUDIO DE ANÁLISIS DE CONCEPTOS

RESUMEN

Objetivo: discutir el uso del software en el análisis de conceptos a través de: 1) consideraciones hechas por pares que aplican el programa en sus prácticas de enfermería; 2) correlación entre el uso del software NVivo 10® y las etapas de análisis de concepto utilizando el método Walker & Avant.
Método: se trata de un ensayo teórico-reflexivo, basado en las etapas de análisis del concepto de Walker y Avant, construido después de un levantamiento bibliográfico y discusión con pares que aplican el marco metodológico y el software de análisis de datos en sus prácticas.
Resultados: los resultados describen las etapas del proceso de elaboración y codificación del software de soporte a partir del análisis de concepto. Se presenta un cuadro con la demostración, descripción y comprensión de las etapas del referente metodológico en el uso del software auxiliar.
Conclusión: el uso de un programa de análisis de conceptos puede facilitar la organización, visualización y acceso a los datos de la investigación. Aunque no reemplaza el trabajo del investigador y la relevancia del marco para el análisis, puede permitir la maximización de los resultados del proceso con beneficios para la investigación analítica.

DESCRIPTORES: Software. Análisis de datos. Formación de conceptos. Enfermería. Buscar.

INTRODUCTION

Concept analysis is considered a strategy or method that predominantly breaks down a concept to examine its elements, uses, similarities or differences[1]. It involves a plurality of philosophical traditions, which can be from conceptual reduction and decontextualization, to the obtaining and preservation of a concept in its production context[1–3].

The predominant approaches of concept analysis used by nursing are: the evolutionary method, the pragmatic utility method and the derivative of the Wilsonian method[4]. The evolutionary method and the pragmatic utility are philosophically supported by the interpretivist paradigm and critical theory, respectively. In this way, they seek, at least partially, to reach and preserve a perspective in a condition of particular use or in different linguistic contexts[1–4]. The third method, proposed by Walker and Avant[5], is an adaptation of Wilson's method[6], used in nursing and aimed at reducing the complexity of concepts, facilitating their understanding and use by beginners[7]. Thus, it would presumably facilitate dialogue in the area, allowing a generation of new knowledge and providing the construction of medium-sized nursing theories[1,5].

However, the method proposed by Walker and Avant[5] has also received criticism from authors, especially related to the excessive simplification of the complexity of conceptual development, the linear use commonly made by analysts, and for having transformed Wilson's cases, which were sources of evidence, in pure illustrations[3–4]. There is also criticism of the analytical decontextualization that would result in a fixed truth, in which the concept becomes a measurable and decontextualized variable[8].

The analyst can deal with other operational and comprehensive challenges in conceptual analysis, such as the need to retrieve, examine and catalog all literature relevant to the concept, which includes obtaining and reading, in full, articles and computerized organization of the literature[9].

In this way, the analyst can question whether there are procedures or tools capable of helping him to preserve some memory of the concept's contextual analysis and, at the same time, promote a more organized identification of the concept's elements in a broad base of sources.

There are technological tools that help organize and access textual material[10], many of which are incorporated into the CAQDAS (Computer-Assisted Qualitative Data Analysis)[11–12] type of software. Such programs are shaped for use with qualitative approaches, which are, for the most part, sensitive to contexts[11]. CAQDAS promotes the organization of the material produced, dealing efficiently with a large data set, facilitating productive teamwork and preserving data in a durable and portable way[13].

The use of software is widespread for qualitative analysis, in content, speech or conversation analysis techniques[14]. Thus, there are several studies that approach concept analysis, especially from the proposal of Walker & Avant[5,7,15–17]. However, analysts do not have, in the literature, a range of descriptions on how to use software to support the performance of concept analysis.

In an innovative way, authors who analyzed the concept of children with complex health conditions, applied the NVivo 10® software to manage interview data[18]. However, there is no detail that allows answering questions such as: how to ensure an organized, interactive and recurring analysis process? How to rethink, re-evaluate previous steps or complete multiple steps simultaneously? How to ensure methodological rigor?

In order to contribute to these responses, this article aims to discuss the use of software in concept analysis through: 1) considerations carried out by peers who apply the program in their nursing practices; 2) correlation between the use of the Nvivo 10® software and the stages of concept analysis using the Walker & Avant method.

CONSIDERATIONS ON CONCEPT ANALYSIS THROUGH THE *SOFTWARE*

The authors develoepd a descriptive framework with the stages of concept analysis according to the Walker & Avant[5] method and correlated to them actions enhanced with the use of the NVivo 10® program (Chart 1).

Chart 1 – Strategy supported by NVivo 10® for concept analysis. Curitiba-PR, Brazil.2023.

Walker & Avant [5] Question/Stage	Action
What concept will be analyzed? (step 1) What are the objectives or goals of the analysis? (step 2)	Theoretical-empirical decisions that are made in the light of the method and precede the use of the software; for example, may include diagnostic or central concepts for the development of theories[5,19].
How to identify concept uses? (step 3)	Search, selection and retrieval: Perform the search of the material, selection and retrieval of the PDF files that will serve the concept analysis. Use the search and collection technique appropriate to the developed design.
How to create a new concept analysis "project" in the software?	NVIVO splash screen, New Project, enter a name for your project[20].
How to save your project?	Your project will be saved every 15 minutes, simply accept this option, or use control + B[20].
How to import the analysis materials retrieved from the search?	Go to external data > PDF > select > import from ... >, select > browse your machine for the selected files> select the file> open> OK[20] (do this as many times as necessary).
How to identify concept uses? (step 3)	Reading, analysis, interpretation and recording of context: Start reading the selected file, read as many times as necessary. Add memos to indicate the analyst's interpretation of the context in which the concept is inserted in that particular source.
How to create a node? (steps 4 to 7)	Create> Nodes> name (name node)> description> OK[20].
How to start the analysis of a specific material?	Enter the sources tab, select the PDF file (result of the integrative review or scoping review), select the file to read.
How to create memos linked to nodes?	Select the node in the list view, or open it in the details view [20:30]. On the Analyze tab, in the Links group, click Memo Link, and then click Link to new memo[20:30]. Enter a name for the memo"[20:30]. "(Optional) Enter a description of the memo"[20:30]. Click OK. The memo opens in edit mode and you can insert the content" [20:30].
How to identify attributes of the concept from the selection of nodes? (step 4)	Select words or expressions used to specify the characteristics of the concept[1,5] Click three dots (bottom right). Select the corresponding node. Click OK.

Chart 1 – Cont.

Walker & Avant [5] Question/Stage	Action
How to model representative cases of the concept from nodes and memoranda? (steps 5 and 6)	It is assumed that the model case must include all the defining attributes. Otherwise, it does not contain any of these defining attributes[5,7]. First, the defining attributes that emerged in step 47 must be clearly stated. To do this, select the corresponding node (intended for the selected attributes). Click nodes > select the node intended for the defining attributes> two clicks on> all the attributes selected for the concept will be displayed. If necessary, reread the constructed reflective memos and defining attributes as many times as necessary. Then, outline a clinical situation that demonstrates each of these defining attributes with their connections. And/or otherwise, a clinical situation that demonstrates none of these existing characteristics[7].
How to identify antecedents of the concept from the selection of nodes? (step 7)	Select the events, occurrences or phenomena that precede the concept of interest[1,5]. > click three dots (bottom right) Select the corresponding node> OK.
How to identify consequences of the concept from the selection of nodes? (step 7)	Select the events or phenomena resulting from the use of the concept[1,5]. Click three dots (bottom right) Select the corresponding node> OK.
How to define the empirical referents from the selection of sources? (step 8)	The empirical referents have a direct connection with the defining attributes, since they measure their frequency or presentation[5,7]. Therefore, it should examine the literature defined to establish whether the empirical indicators of its particular concept have been presented and, if so, whether there are currently instruments or measures on its particular indicators[5,7]. To do this, in the view, in the lower left corner, select > fonts. Or, in the >nodes> view double-click the built nodes. In the lower-right corner, select the text tab [20].

Source: according to concept analysis proposed by Walker and Avant (2019)[5] and NVivo software 10 20™.

Concept selection step 1 should be based on its usefulness for the area of interest. As for the second stage, the objective of the analysis may be related to elucidating a current concept, building an operational definition, a research instrument, among other possible purposes[5].

In the third stage, it is important to investigate all possibilities of using the concept, that is, in the subject of interest and in other subjects. In this sense, there should be a wide investigation in the literature [5].

An extensive literature review is required to provide a detailed description of the concept. However, the search and selection may return a high amount of texts required for analysis, which represents a challenge for the analyst, but which can be minimized by using the software.

The authors of the analysis method point out that the extensive literature review can cause overload. Thus, they recommend that the analyst keep the focus on step 3, guided to identify the definitions and use of the concept. For this, he can prepare brief summaries of each source and produce a database spreadsheet[5].

While spreadsheets can be helpful, it is understood that analysis software could be more beneficial. For example, NVivo 10® is software developed by QSR International[21] for qualitative data analysis, especially highlighting its use in content and narrative analysis. The software promotes a workspace to store, manage, question and analyze the data structure[22]. In this sense, memos are excellent tools for important notes, among them, the context of emergence, use, and development of the analyzed concept. It should be noted that the content of the memos can be constantly revised.

The literature mentions that it has the potential to contribute to a quick and easy analysis of a large amount of data[12–14], which may be of relevance for application in concept analysis, particularly when a lot of material is available for the work of the analyst.

A spreadsheet can be useful for documenting notes on definitions and the uses of the concept, although linking the content to digital files organized in folders outside the spreadsheet needs to be hyperlinked. Such hyperlinks can be broken if a file is deleted or if the folder system is disorganized. In this regard, NVivo 10® can be a better solution as it can create its own project for the analysis and allows the digital files to be imported into this project in an interactive and organized way.

NVivo 10® is structured in fonts; search tools; nodes and coding. Sources are all data necessary for the development of the research. They are text documents (doc, docx, rtf, txt, PDF); audios (mp3, wav), videos (mpeg, avi, mov), images (bmp, gif, jpg, tif), files of the most varied formats that can be imported into the software or linked through a link with other locations, like the web. Some fonts, like documents, can also be created directly in software[10,21].

Search tools are at the heart of qualitative data analysis in NVivo 10®. Filters can be saved and guide the development of projects[22]. The use of tools, such as software, can increase the rigor of a qualitative research, especially those with a large amount of data[10].

There is a certain pattern of organization in qualitative analyzes using software: it starts with sending and guiding the bibliographic data, followed by forwarding and coding the sources to group the materials into themes (nodes). Nodes are arranged in hierarchies that respond to design queries. Case nodes are determined and categorized, aiming to link descriptive data regarding the empirical units of analysis. Queries show arrangements of how data connects and can be shared across reports[10].

One of the central and indicative aspects of using this software in concept analysis would be the creation of nodes. Nodes are useful for developing steps 4 through 7 in concept analysis, namely: 4. Determine the defining attributes; 5. Identify a case model; 6. Identify additional, borderline, related, contrary, invented and illegitimate cases; 7. Identify antecedents and consequences[5]. In this way, methodological rigor is maintained, since the creation of nodes is driven by the steps of the concept analysis method. The process of interpretation, extraction and codification of data is carried out by the researcher after a thorough reading of the text.

The determination of attributes contributes to the clarity of the structural elements that help to differentiate one concept from another, with regard to what the concept is, and what it represents. Such attributes will be needed later in the construction of a model case, also used to exemplify the application of the concept. In the sixth stage, other case typologies can be described to help understand the concept's attributes, bringing aspects of similarity, distinction, limitation, creativity, as well as representing what the concept is not, which would correspond to the contrary cases. In the seventh stage, the antecedents to the events that are essential to the existence of the concept and the consequences or resulting from the occurrence of the concept are verified[5].

Attributes, antecedents and consequents are not self-defining and, as such, need careful coding by the analyst. In NVivo 10®, coding is the activity of building nodes, performed by the researcher. The act of coding involves selecting words, sentences, audio clippings, which, when organized, bring meaning to the research process. NVivo 10® also enables self-coding, which is often used when there is a large variety of data[22].

The nodes, as the main features of NVivo 10®, indicate the data conservation structures encoded to manifest different meanings, according to the methodological approach. They are small flexible boxes for storing part or all of the data, and may also be concepts or be based on an organizational structure, an idea, a phenomenon, that is, it is a part of the whole research process[22–23].

Using the NVivo 10® software, units/categories can be registered and stored through "nodes", which work as indexers or categorizers of data or information segments related to attributes, antecedents and consequents. Still, with nodes, there is potential to assemble a hierarchical structure that aggregates the elements of the decomposed concept in sublevels. It is assumed that the identification and organization of the attributes can be a support resource for the analyst to make the realization of the steps "modeling the representative cases of the concept" and "identifying the empirical indicators" visible and more dynamic. The "coding" of sources, by aggregating material on themes and specific topics within the nodes[21], also enhances the exploration of sources (documents, PDFs), guided by the nodes.

The construction of model and additional cases requires the appropriate use of conceptual attributes. However, faced with a high number of sources, it can be an exhaustive task to retrieve them. Thus, the Nvivo 10® search engines facilitate access to all data and make the numerous manual processes performed by researchers to retrieve attributes during concept analysis unnecessary. The same can be applied to the categories of antecedents and consequents.

The sources and nodes themselves can contribute to the realization of step 8 of the concept analysis, that of defining empirical indicators[5].

In the project memorandum, notes, presumptions and important future decisions can be noted as a journal, requiring periodic renewal and the introduction of *links* to sources and nodes. In our memos, it is explained why this theme is significant in the conceptual analysis[21,23,24]. Likewise, the incorporation of data in accordance with the thinking and development about the attributes, antecedents and consequences occurs. In addition, they support the connection to the steps of "model cases (steps 5 and 6)" and "identify the empirical indicators (step 8)"[5]. In the formation of analytical memoranda, procedural findings are written to record the methodological phases achieved[24].

More broadly, for topical coding and analytics, the analyst can employ thought-provoking questions: "What is the topic under discussion?" (topic coding); "What is the content really about?", "Why is it considered a defining attribute? Background? Consequent?" (analytical coding). For descriptive coding, context investigation can be explored and new ideas can be realized by questions such as: "What is happening?", "Which organization is being identified?".

Considering the breadth of concept analysis, after coding and exploring a node, it is necessary to reflect on the discoveries made through it. It is recommended that the memos produced in the software are also used by the analyst to explore relationships and record thoughts[24]. Memos are like documents and are capable of being linked to sources or nodes[23].

Thus, the use of NVivo software in concept analysis can be broad, from initial representations, to fully grounded ideas about the topic under analysis. In addition, it is possible to track the analytical process with memos, increasing the reliability and credibility of the findings. In this way, the composition of project, node and analytical memos is suggested, during the concept analysis with support of the NVivo 10® software.

The authors of this article understand that the concept analysis requires the verification of the relations between the intrinsic elements of the concept or between different concepts, especially for the judgment of what is the antecedent and the consequent. Thus, the software becomes a tool that facilitates the verification of relationships between data through the generation of graphs indicating the association between project items. Examples of the aforementioned relationships can be in items

related to a source or a selected node, or in linking formats and graphical representations to project items.

Although the most common designation for CAQDAS involves the term "analysis", their procedural actions are not truly analytical, but only facilitators of necessary routines for analysis[21,22]. Thus, even if they are tools that help the analyst in the task of analyzing concepts, they do not replace the human element in the central condition of the process.

NVivo 10® can be a tool that facilitates qualitative research processes, especially in analyses, by enhancing and intensifying the attainment of depth, allowing greater recognition of data complexity[10]. However, as with other computer programs, for its proficient use, it is necessary that the researcher has knowledge of the tool and the methodological approach that he intends to use, in order to adapt the said support tool to the real needs of the research carried out[23, 25]. It should be remembered that the data entry and encoding process is time-consuming and most of the work is carried out by the researcher and not by the program.

Specific tools such as NVivo®, Atlas/ti, NUD*IST, QCA, The Ethnograph and others, are in the category of theory-inducing programs based on coding[10]. In the literature, there is a vast description of the categories or coding units and the techniques for their extraction in content analysis and Grounded Theory[26,27]. Thus, by analogy, one can obtain knowledge of identification and manipulation of attributes, antecedents and consequences as aggregated information that form the essential units or categories of data codification of an analyzed concept.

In our experience, we reflect that the use of the mentioned program for concept analysis helps the theorist to systematize, organize and plan the development of the analysis, as well as in the manipulation and access to numerous data sources in an easy way, maintaining the visualization of the development of the chosen analysis model. Thus, this program allows the analyst to have time to reflect on the necessary conceptual abstraction.

CONCLUSION

Data analysis software can assist in the systematization of concept studies, bringing greater depth and benefits to storage, data encoding, categorization, file import, memo creation and their connection with selected material fragments. The feasibility of linking the software to the methodological framework favors the researcher's work, and may increase the transparency and reliability of their findings.

This theoretical-reflective essay may contribute to future concept analysis research by indicating possibilities currently not recognized by analysts. Additionally, it may indicate a potential already present in computational resources available today, which have established application in other types of analysis, such as content and discourse. This opens a field for future application in empirical research and for new reflections arising from application research.

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NOTES

ORIGIN OF THE ARTICLE
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CONTRIBUTION OF AUTHORITY
Study design: Tonin L, Lacerda MR.
Data collection: Tonin L.
Analysis and interpretation of the data: Tonin L, Lacerda MR, Brandão MAG.
Discussion of the results: Tonin L, Nascimento JD, Souza JF, Rosso H.
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CONFLICT OF INTEREST
There is no conflict of interest.

CORRESPONDING AUTHOR
Luana Tonin
luanatonin@gmail.com