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Using NVivo™ for Literature Reviews: The Eight Step Pedagogy (N7+1)

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Abstract

While a literature review is a necessary milestone to be completed by all researchers in a timely and efficient manner, it is often one of the most difficult aspects of the research journey. Moreover, traditional approaches often leave novice researchers, to struggle with the conceptualisation of their literature review, now complicated by the overwhelming quantity of research available online. This paper presents a rationale the use of Qualitative Data Analysis Software (QDAS) programs for literature reviews. QDAS tools allow the researcher to explore large amounts of textual documents to see patterns. These programs are often overlooked by novice researchers due to their complexity and the lack of expertise provided to assist them. To combat this dilemma our paper outlines the N7+1 approach to using Nvivo11™ for literature reviews. Through this approach researchers can develop an "auditable footprint," keep everything in one place, and go paperless.

Using NVivo™ for Literature Reviews:
The Eight Step Pedagogy (N7+1)

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While a literature review is a necessary milestone to be completed by all researchers in a timely and efficient manner, it is often one of the most difficult aspects of the research journey. Moreover, traditional approaches often leave novice researchers, to struggle with the conceptualisation of their literature review, now complicated by the overwhelming quantity of research available online. This paper presents a rationale the use of Qualitative Data Analysis Software (QDAS) programs for literature reviews. QDAS tools allow the researcher to explore large amounts of textual documents to see patterns. These programs are often overlooked by novice researchers due to their complexity and the lack of expertise provided to assist them. To combat this dilemma our paper outlines the N7+1 approach to using Nvivo11™ for literature reviews. Through this approach researchers can develop an "auditable footprint," keep everything in one place, and go paperless. Keywords: Doctoral Research, Novice Researchers, NVivo™, Literature Review, Transparency, QDAS, Data Analysis, Teaching Qualitative Research, CAQDAS

Introduction

In this paper, we argue for the benefits of a pedagogical approach to training novice researchers, including doctoral candidates, in developing, by analysis and synthesis, the literature review for their research proposal or thesis. We begin by outlining the importance of the literature review in research work and suggested best practices for the process. We review the difficulties that are typically faced when using traditional approaches to conducting a literature review. In response to these difficulties, we consider the use of qualitative data analysis software (QDAS) to analyse literature in preparation for the next stage of the study, research design. We propose the N7+1 (O'Neill & Booth, 2017) pedagogical framework as a way forward. This pedagogical framework guides the novice researcher through the justification for eight clear steps in the use of NVivo™ Version 11. The steps include setting up an NVivo™ project, importing and classifying literature, and classifying and visualising literature to develop themes that will be included in the review. The N7+1 pedagogical framework can become a resource for future work, as it allows the resulting review to be adapted for different audiences.

Writing a Literature Review

The literature review is often the first piece of academic research and writing that new scholars will undertake. By doing so, they establish their clear understanding of the researchers

in their field and knowledge of their work, second, they use the literature to build an argument for their own study and third, they use this review to put their own results into context (Winchester & Salji, 2016). This is no easy task for the novice researcher who may not yet have had an opportunity to develop the relevant skills (Probert, 2004). Writing literature reviews is central to all fields of research and therefore all academic activity (Cook & Murowchick, 2014; Van Wee, & Banister, 2016) and may be a challenge to new scholars even if they are otherwise good writers (Zorn & Campbell, 2006).

Without training, literature reviews may be done poorly; there is a plethora of literature detailing various processes promoting high-quality literature reviews (see, for example, Bloomberg & Volpe, 2012; Freer & Baker, 2008; Steward, 2004). A common mistake is the temptation to simply retell the research using quotes to demonstrate understanding, resulting in a disjointed review that does not have a strong line of argument throughout (Zorn & Campbell, 2006). The traditional approach typically includes the following steps; "forming research questions, finding appropriate sources, carefully reading, writing an annotated bibliography, synthesizing, integrating, supporting their argument, and presenting their work" (Cook & Murowchick, 2014, p. 4). Covering all these areas can be a daunting task.

To become familiar with a topic, researchers must engage with the existing bodies of work by reading and understanding relevant literature (Boell & Cecez-Kecmanovic, 2014; Humble, 2012). In decades past, this was limited to physical libraries, yet, this situation has changed dramatically in recent years. The amount of literature produced is increasing exponentially, leaving researchers to conduct digital searches that include databases for research and review papers, reference databases and public data sets to locate hundreds if not thousands of pieces of relevant literature (Prensky, 2001). Once this mountain of literature has been collated it needs to be prioritized, understood and interpreted, with a view to presenting a synthesis of the literature that advances knowledge (Boell & Cecez-Kecmanovic, 2014; Bernard, Wutich, & Ryan, 2017). Vom Brocke, Simons, Niehaves, Riemer, Plattfaut, and Cleven (2009) outline the importance of this process by drawing an analogy between Sir Isaac Newton's famous quote "If I can see further, it is because I am standing on the shoulders of giants" and the essential role the literature review plays in serving as the shoulders upon which new scholars stand. As a result, the process of writing a literature review can be condensed to three broad aspects: identification of relevant literature; understanding and interpreting this literature; and writing a review that creates a new perspective (Boell & Cecez-Kecmanovic, 2014).

The priority, therefore, is to provide training through offering guidelines for each aspect of the literature review process. For example, by introducing a systematic and comprehensive approach to conducting searches, researchers will learn to avoid sources such as generic textbooks (Zorn & Campbell, 2006) in favor of primary sources. Despite careful consideration of each aspect, understanding and interpreting the literature is the most difficult aspect of all (Parker, 1998). This may relate to the lack of a clear sense of purpose in the writing (Zorn & Campbell, 2006) or the sheer volume of literature taking the researcher in many different directions, making it difficult to establish a clear line argument. This is where the use of QDAS can be particularly powerful.

Integrating Qualitative Data Analysis Software

Qualitative data analysis is an interpretative process that benefits from the use of QDAS - a tool for researchers to use as they drive the analysis of their data. QDAS packages have become increasingly more sophisticated, supporting a deep analysis of large amounts of data by the researchers who use them. In terms of the literature review process, QDAS supports researcher reading and interpretation of large numbers of journal articles and other texts,

enabling them to create links, visualize connections and ultimately identify areas in which not much research has yet been done (known as the "gap" in the literature). Kaefer, Roper, and Sinha (2015) argued that flexibility and transparency are the "key advantages of using software-assisted analysis over manual methods" (p. 1). The researcher takes direct control of this interpretative process through the movement of data into meaningful categories (Bandura, 1977; Wolfswinkel, Furtmueller, & Wilderom, 2013). In this way, QDAS adds transparency, as researchers can track how they have located and coded their emergent themes in the data (Lewins, 2007). Jackson (2014) described this process as "transparency-in-motion" (p.1) arguing that it promotes a reliable and trackable process, which can ultimately add rigor to the analysis. The outcome is that the researcher is provided with a "particular insight into existing knowledge" (Bazeley & Jackson, 2013, p. 34). These insights will depend on the approach adopted as there is no uniform framework for conducting a qualitative analysis of the literature or of research data. QDAS programs have been designed for a multitude of uses by providing tools for analysis and reanalysis of the data. Although the flexibility of these programs are their strength, it also opens them up to criticism.

Persistent criticisms of QDAS in the research literature, framed by Jackson, Paulus and Woolf (this issue) as misconceptions, are derived from how the software is used (or misused) rather than the software itself. This is evident in QDAS workshops where trainers focus on the features of the software rather than how these features can be used to enhance their research process (Sohn, 2017). Bourdon (2002) noted that "limitations arise when researchers who do decide to use QDAS software perceive it as a handy utensil or convenient tool, and the chosen software does not become a fully integrated part of the very design of the research project" (p. 21). As such, effective use of QDAS tools is driven by the methodology and methods (Macmillan, 2005; Macmillan & Koenig, 2004). In this regard, QDAS programs should not be treated as separate process from the overall research methodology (see for example, Sinkovics & Alfoldi, 2012; Leitch, Oktay, & Meehan, 2016; Oblinger, & Oblinger, 2005.).QDAS programs could be used both for thematic development in service of a literature review and to "enhance the methods and methodology chosen for a specific study" (Kaefer et al., 2015, p. 1).

NVivo™ is one such QDAS program that supports visualization of emerging themes in the literature and enables creation of a snapshot of each theme. This helps to highlight the gaps in the literature (that is, areas in which not much research has been done). This approach provides an efficient system to store and to conduct an effective analysis of the literature in their field (Shenton, 2004). Like other QDAS programs, NVivo provides "paperless storage" of the data and the literature which supports ease of writing. Despite these benefits, QDAS remain underutilised for literature reviews. Recently QDAS developers have started to use blogs to provide tips and ideas on how to use their programs for literature reviews (see for example, QSR International, 2014; MAXQDA, 2017; Mohamad, 2017; Pope, 2017). To extend these developer-based approaches, this paper outlines the N7+1 (O'Neill & Booth, 2017), a full pedagogy that has been developed to assist novice researchers in writing their literature review using NVivo™.

Using N7+1 to Write a Literature Review

This section outlines the pedagogy of N7+1 (O'Neill & Booth, 2017) using Jackson's (2014) concept of transparency-in-motion. The N7+1 pedagogy has been designed to guide novice researchers from all disciplines through eight steps of writing a literature review with the support of NVivo™ version 11. It is an innovative framework and teaching/learning resource that can equip novice researchers with the necessary skills to complete the initial milestone of their research in a more efficient and effective manner and to equip them with skills for their future research careers. The N7+1 sequence of steps takes the researcher from a

search of databases, to analysis of literature and through to writing up the review. The complete pedagogy comprises eight steps and these are described in three modules of an eBook (O'Neill & Booth, 2017a), which are as follows:

1.   Module 1: Preparation
     •   Step 1: Set Up NVivo™ Project
     •   Step 2: Searching Literature using the NCapture Tool
     •   Step 3: Sort Literature, Prepare Endnote and Importing into NVivo™
2.   Module 2: Analysis
     •   Step 4: Classifying Literature: Creating a Snapshot of your NVivo Project
     •   Step 5: Visualisation
     •   Step 6: 1st Level Descriptive and Topic Coding of Literature for Themes
3.   Module 3: Writing a Literature Review
     •   Step 7: Summarise your NVivo™ Project
     •   Plus 1: Write Up

By systematically following the processes in each of the N7+1 Steps using the NVivo™ "tools" (O'Neill, 2012) to support each step, candidates can learn to conduct a rigorous analysis of the research literature. As qualitative analysis involves exploration of large amounts of text, the same software tools can be used for literature reviews. Therefore, the skills developed through the N7+1 process can be transferred to other forms of qualitative analysis.

Once a project has been set up and data imported, it is likely that students will move back and forth between the steps as necessary (Lewins, 2007b). Such movement will occur constantly between Steps 4, 5, 6, 7 and the + 1 Step. The "plus one" step is so named because it is separate from the framework matrices within NVivo and can be exported for write up in programs such as Microsoft Word or Scrivener. An overview of the N7+1 the 8step pedagogy is seen in Figure 1.
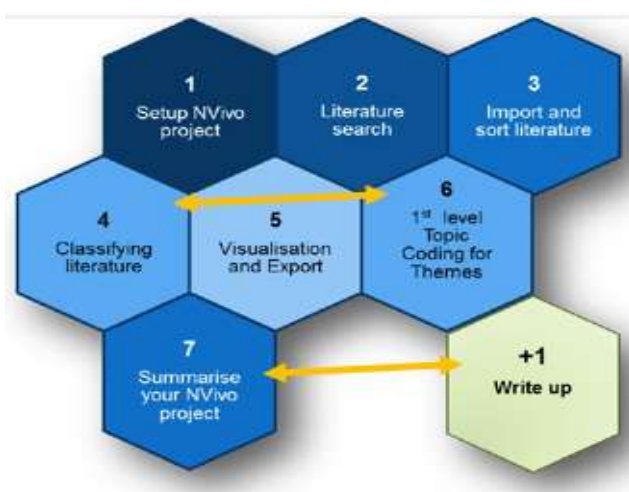

Figure 1. N7+1, the 8 Step Pedagogy

Following this pedagogy provides a structured scaffold to drive the software. In other words, it permits the user to take the lead and choose the tools in NVivo that will best analyse the literature to achieve a thematic/systematic review.

Step 1: Set up NVivo™ Project

Step 1 takes the novice researcher from accessing the software through to setting up a new project in NVivo. By including such basic steps, it allows the less computer savvy researcher to get started immediately. Access to this information is available at any time from the interactive eBook (O'Neill & Booth, 2017a) and YouTube videos (O'Neill & Booth, 2017b).

For example, to set up a new NVivo project the researcher needs to familiarise themselves with the three main areas of the interface. Step 1 takes the researcher through the NVivo interface which include: "Tools," "Main view" and "Containers" (see Figure 2).
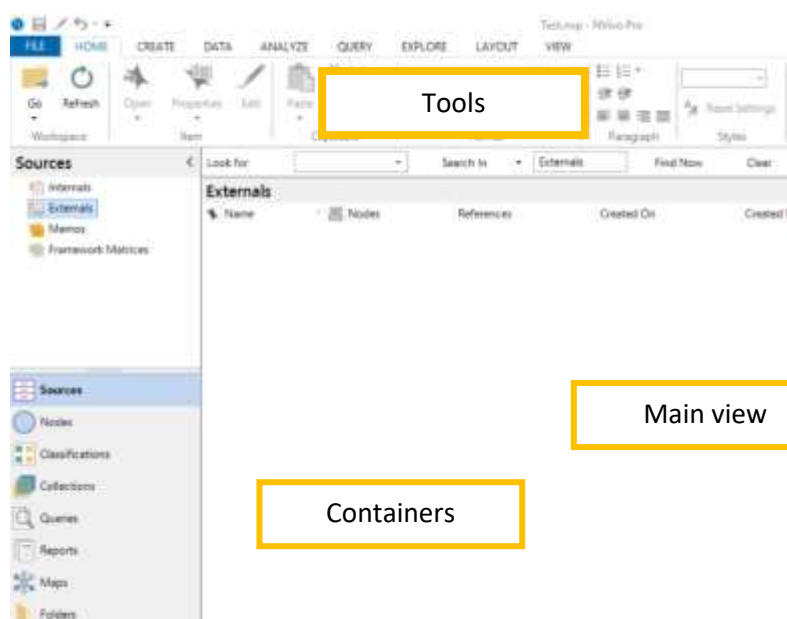

Figure 2. Step 1: Three main areas of the NVivo™ Interface

The "tools" allow easy access to the data analysis functions of the software. The "main view" is where actions take place such as data analysis or visualisations. Finally, the "containers" hold the various forms of interrogated data. To embrace Jackson's (2014) concept of "close and far" each area of the interface must be understood. The "tool" and "containers" areas create distance from the data, while closeness to data is achieved by interrogating entries that populate the "main view." As Jackson argues, the researcher needs to maintain the closeness to their data to maintain the constant integration and rigor of their findings.
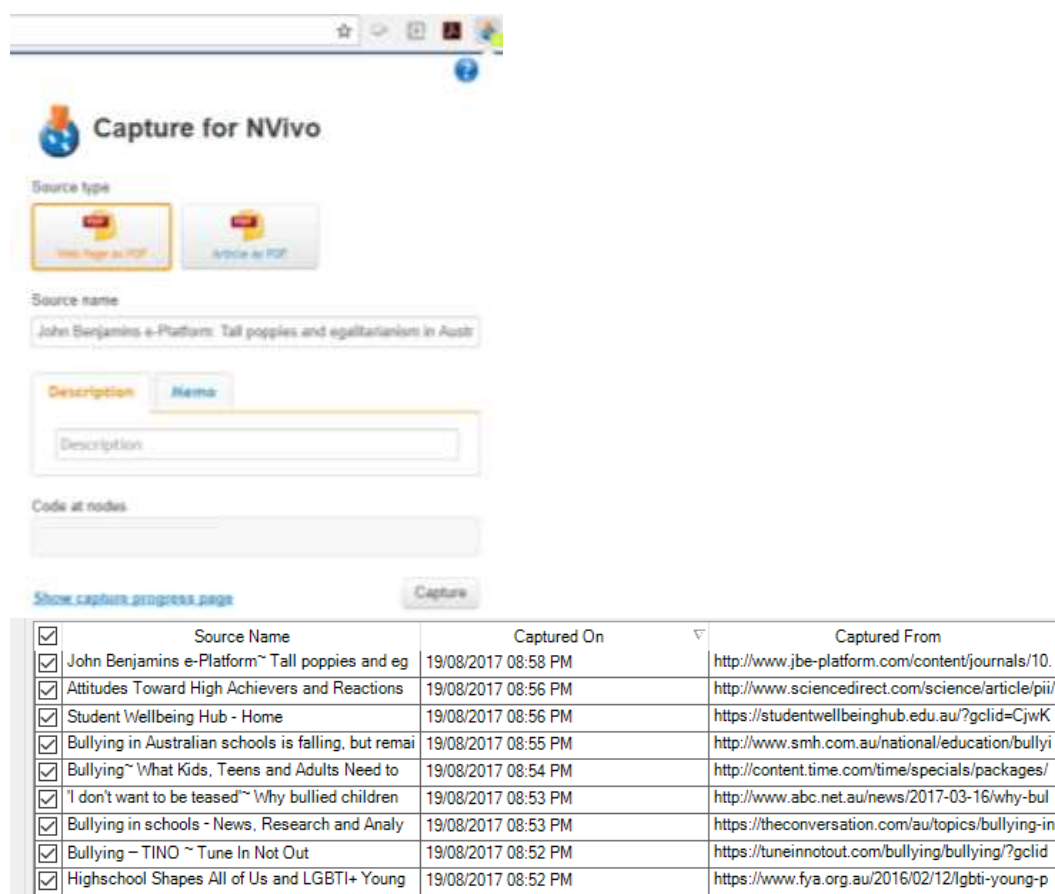
Step 2: Searching Literature using the NCapture Tool

The quality of a literature review depends on the quality and relevance of the literature analysed. NVivo allows researchers to enter a large amount of literature into the program and sort the most relevant for a particular study in a timely manner. This is aided by the use of NCapture, a tool for directly importing literature into NVivo, and the focus of Step 2.

Specifically, NCapture is a web browser add-on tool for importing information from a citation management system directly into the software. Using NCapture provides a succinct and clear history of the types of literature being imported and reviewed. This visible record

allows the researcher to clearly keep track of the types and amount of literature that has been imported and sorted.

The NCapture browser tool interface is illustrated at the top of Figure 3, and the NCapture list of imported articles at the bottom.

Figure 3. Step 2: The two-part Literature Search that requires using NCapture Tool and Importing to NVivo™

Once literature is imported into the project, multiple search expressions by either keywords or themes can be run. Multiple searches can assist with reaching saturation of the thematic analysis of sources. As seen in the lower section of Figure 3, a search based on a key word, bullying, was conducted. This key word was then entered into databases including Google Scholar and Scopus. NVivo also allows the researcher to import from reference management tools such as Endnote (which will be outlined in Step 3). The advantages of NCapture over dragging and dropping articles into the project file is that the bibliographical information is automatically attached to the article including the details of the data base, web page and social media site. This is stored in the Cloud which is accessible from multiple projects by the same user. An advantage in this step is that a visual summary of the previously imported captures is visible preventing duplication of captures in your NVivo™ project.

Novice researchers may not be aware of the variety of library and publisher databases available to them. It is also important that students understand which literature is seminal, appropriate, or inappropriate to use in their research literature review. If an author is cited numerous times in the literature, it can be inferred that their work is worth exploring further. Additionally, it is important to understand the search dimensions available within each database which can be recorded in the section of "description" in the dropdown screen that appears of

the NCapture tool.

Step 3: Sort Literature, Prepare Endnote and Importing into NVivo™

In addition to adding literature sources via NCapture files into the project, individual journal articles can be directly imported from reference management software such as Endnote. Citation management software tools such as Endnote, Refworks, Mendeley and Zotero help researchers manage large numbers of citations. As a result, many researchers may have a substantial library before adopting QDAS. This link between the reference management tool and the software analysis tool ensures a continuity when writing up the literature analysis conducted in NVivo with referencing from Endnote. However, it is imperative that the library is organised in a way to create ease of analysis in NVivo. Therefore, Step 3 takes the researcher through the process of sorting their Endnote library before importing it into NVivo. This includes organising folders into themes and attaching the relevant PDF files to their references.

Figure 4 illustrates an example of the organisation of literature into folders. On the left-hand panel are groups from the initial sorting process about school-aged athletes (the four themes in Figure 4 include "bullying," "duality issues," "sport schools" and "women in sport"). In the centre, is a list of the references and on the right, the information from a selected reference. Any notes made in Endnote in the "research notes" field in the reference window are imported and appear as memos attached to the text.
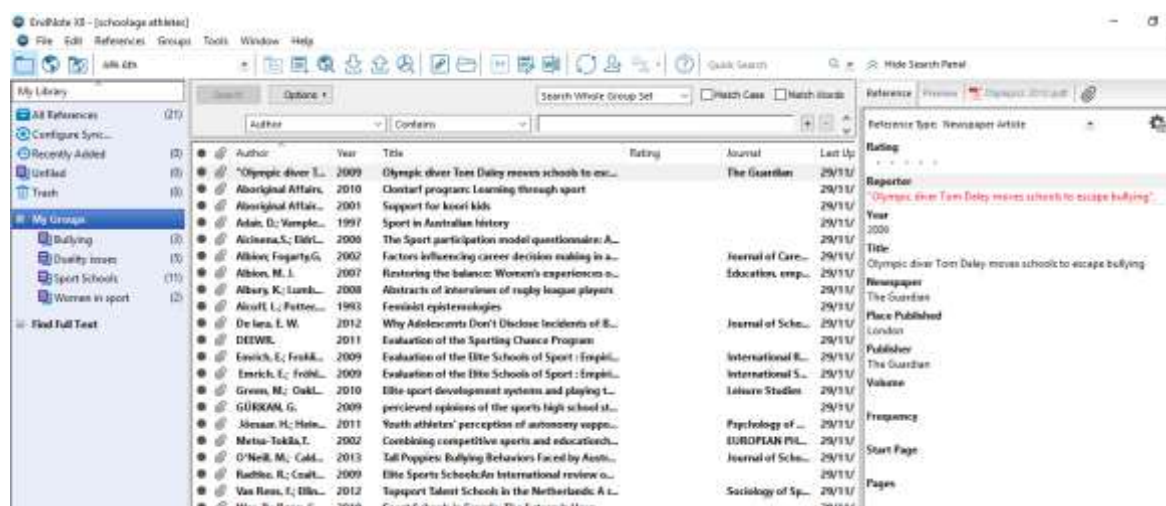
Figure 4. Example of the school age athletes' Endnote library

The advantage of importing the reference library via NVivo import function is that a snapshot of all the details of your references can be constructed (in NVivo this is called Source Classification sheet and will be explained in Step 4). While there are many citation management systems available our own experiences suggest that Endnote is the most reliable and compatible tool to use when setting up literature in an NVivo project.

Step 4: Classifying Literature: Creating a Snapshot of your NVivo Project

In Step 4, the researcher classifies the types of literature that has been imported into the project. In this step, bibliographical information about each literature source is organized. Descriptive information about all the literature contained within the project such as author, year of publication and title, can be viewed together. For example, the table in Figure 5 shows all

the items imported via NCapture and Endnote and their reference information. This creates a snapshot of all literature entries, enabling the researcher to quickly review what types of literature have been collected and if there is a need to broaden or narrow the search. In Figure 5 it is clear that a range of reference types have been included from journal articles, books and newspaper article across a range of dates. However, there is no literature after 2010 which may prompt the researcher to search for more recent items.

Figure 5. Step 4: Source classifications sheet for literature captured via NCapture and Endnote

As shown in Figure 5, all journal articles, books, newspapers, conference paper links and characteristics are listed. In addition to using these attributes to explore the literature within the project, the researcher can investigate *keywords* and or *labels* of the literature. This is particularly relevant to those undertaking a systematic literature review where key words are part of the finding and sorting process.

Figure 6. Step 4: Source classifications "keywords" investigation

As seen in Figure 6, the summary list of keywords directs the researcher to areas with missing or limited information. For example, there is a listing labelled "unassigned" articles which indicates that keywords still need to be allocated. Further, this listing in combination with the chart wizard can illustrate and illuminate a "gap" in the search or a "gap" in the literature which can be investigated further. For example, "physical education and training" only appears twice on this list yet we would expect numerous articles including "physical education and training" as key words. This indicates a potential area for further exploration.

Step 5: Visualization

Sometimes researchers can become overwhelmed by the literature and struggle to make sense of it or narrow it down to a selection that is relevant for their research question. Visualisations of the literature content such as charts, word trees and concept maps can assist by illuminating possible connections between articles. Step 5 focuses on the visualisations that NVivo™ can produce – which is a movement back to being "close" to the data (Jackson, 2014) during which patterns, trends and connections can be explored.

NVivo™ has the functionality to search across the literature sources for specific query phrases, words, or broad terms – quickly revealing the most frequently occurring words in those sources. The search terms determine the visualisation outputs for these data. To provide an example, an NVivo word cloud has been generated in Figure 7 from literature coded under the theme *duality*. This theme explores issues that school age athletes encounter in combining dual endeavours of sport and study options.

Figure 7. Step 5: Word Cloud used to Visualise Literature coded concerning the issues school age athletes encounter in combining dual endeavours of sport and study options

As can be seen in Figure 7, the size of the word is directly correlated with its frequency of use. Those most obvious include: "decisiveness," "time," "study," and "informed." The frequency data identified in the word cloud may signal connections across different publications which may not have been obvious from manual note-taking alone. For instance, the researcher may have had a preconceived idea about "decisiveness" and only thought of it in terms of choosing between sport and study. However, from examining all the contexts in which the word "decisiveness" occurs it also refers to "decisiveness" as choosing between a social life, sport and study. This extra connection within the term "decisiveness" could have been missed through manual coding.

Visualisations give the researcher a snapshot of what is present across the literature sources that have been imported, and, equally importantly, suggest what is missing. They can help researchers achieve a greater closeness as keywords and even themes that may not have been obvious by reading and highlighting on paper become visible. These visualisations can be exported and included in presentations or simply shown to a supervisor to illustrate the development and connection of themes. Guidance in interpretation must be given for the use of word clouds, word trees, explore diagrams and concept maps. Word clouds, for example, are based on frequency of occurrence only, which is not the same as relevance or importance. In Figure 7, "lack" is not as dominant as the other themes but when investigated further, it highlighted the lack of support in making critical prioritisations in decisions involving sport and training commitments. This ultimately became a central theme in the final literature review.

As all data in NVivo™ is hyperlinked, it is easy to explore, through a text search query within the word cloud, which literature sources have the significant words in them. Text searches enable the researcher to see if there are words which appear frequently together, such as "work life balance." However, the researcher must manually filter these generated terms as they may include references to irrelevant sections of the text such as citations.

Step 6: 1st Level Descriptive and Topic Coding of Literature for Themes

As described earlier, the purpose of a literature review is to build an argument and put the proposed research study into context (Winchester & Salji, 2016). Therefore, themes must

be developed to organise the relevant literature to support both argument and context. Step 6 takes researchers through descriptive and topic coding which will generate these themes. This is where "chunks" of text are moved to containers called nodes. Theme nodes represent the topics found in your source material, specifically the research literature articles. For example, the theme "Duality" arose in the articles. Descriptive coding refers to a description given to coded text which represents an issue. For example, a chunk of text described the competing dual commitments of athletes which was therefore coded as "work life balance." The more analytical content, such as why the issue matters, is considered topic coding. For example, the conflict of dual endeavours and the pressures to perform would be coded as "Pressures to perform." By undertaking this step, the researcher will begin to better understand the larger context of the topic of interest and eventually identify where additional research is needed. For example, the issue of bullying may not have been explored in the context of school- aged athletes and an argument can be made for a research study in this context. However, if no gaps appear, the research focus may need to be re-examined.

The ease in which text can be coded is an advantage of QDAS software (Rademaker,, Grace, & Curda, 2012). Chunks of text from the same and different articles can be collated together. Figure 8 shows how highlighted text about duality was dragged and dropped into a container (the blue circle) titled duality of life. An advantage of coding with NVivo over manual coding is quick access to the original document. Sometimes a chunk of text may need to be seen in a wider context to be understood, in which case there is a live link from the coded text back to the original article.
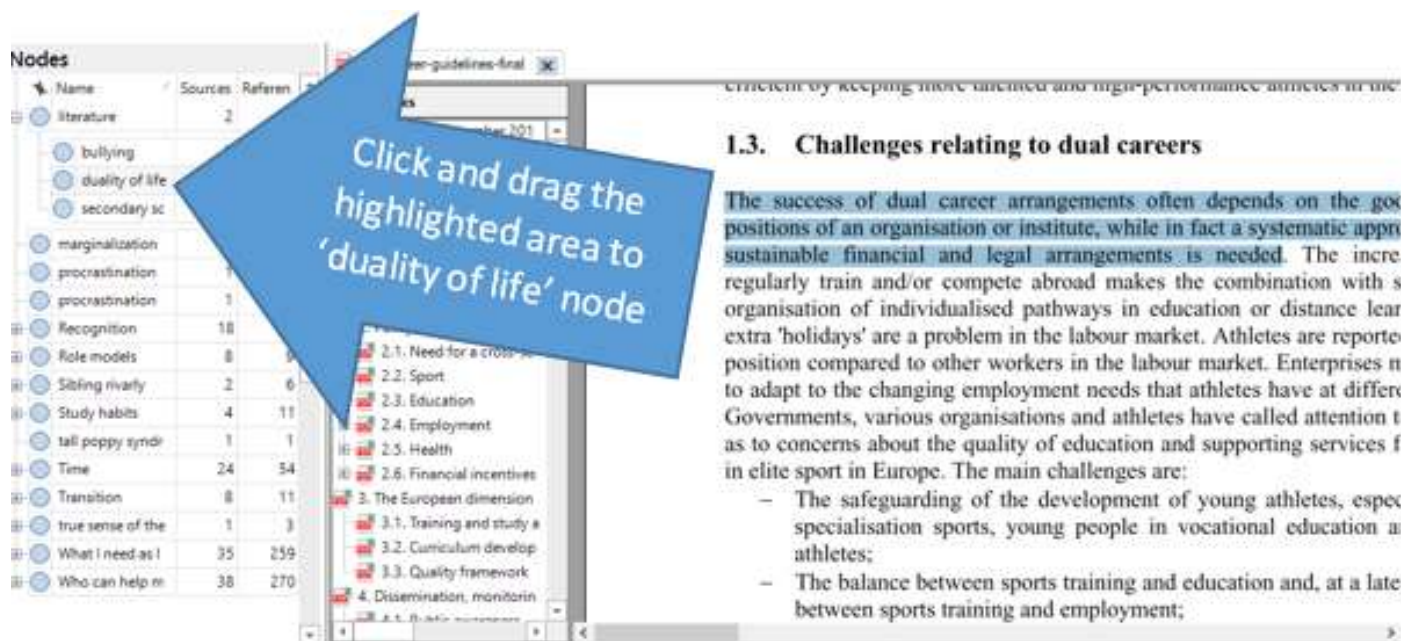
Figure 8. Step 6: Descriptive and topic coding

Additionally, as seen in Figure 8 there are several nodes created. NVivo™ makes it possible to merge similar nodes together as the analysis progresses. This encourages a critical and reflective process when developing a literature review. For example, when consolidating major nodes, it is important to constantly ask questions such as, "what is this a sort of." For example, in Figure 8, the nodes of bullying, duality of life, marginalisation and procrastination can eventually all be "sorts of" the challenges school age athletes face in combing both sport and training. Hence, the researcher can commence creating an audit trail of collapsing nodes that contain similarly themed content.

As coding begins, it is important to continue to step back and see which literature is being coded most frequently and under which themes. Some codes may appear populated but on closer inspection may only include quotes from one source. As seen in the Explore diagram presented in Figure 9 a quick check summary of all associated data about one theme is displayed. For example, in Figure 9 the main Australian Sport Policy file is featured with three associated data linked.

Figure 9. Step 5: Explore diagram used to demonstrate all associated data coded concerning the Australia's Winning Edge Sport Policy.

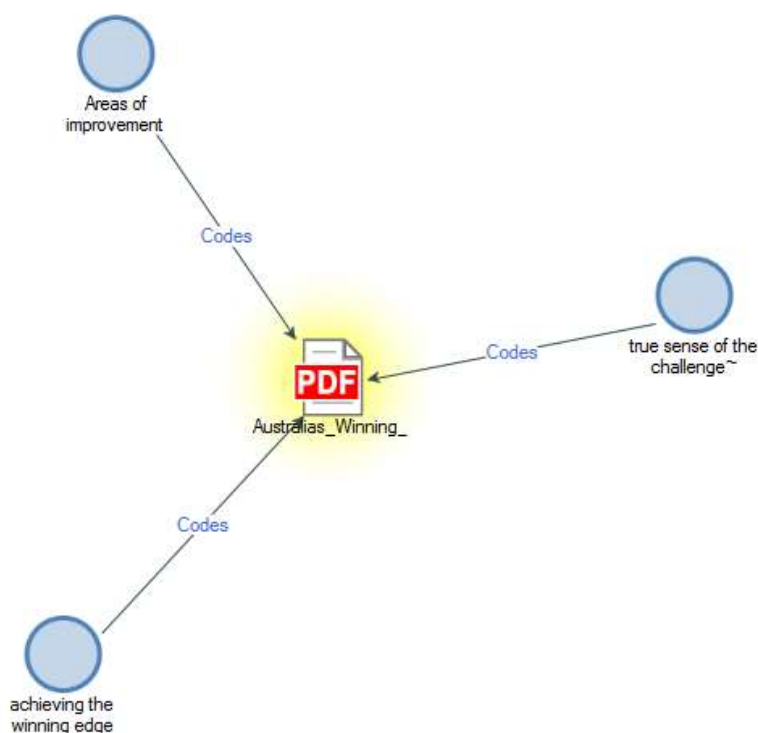From this diagram, the researcher can discern if more coding is necessary by the number of codes and type of codes Additionally, the functionality of the explore diagram provides the researcher with the ability to also change the focus and switch to any of the three other pieces of associated data. For instance, the researcher may switch the focus to "achieving the winning edge" to see which other sources and themes are associated with it. In this way, the researcher is provided with a broader view of how their literature is coded and an indication of areas for further exploration.

Step 7: Summarize your NVivo™ Project

Step 7 involves the synthesis of codes into larger themes for the literature chapter write up. NVivo™ provides a tool which can help discern saturation point. For saturation to be reached, the researcher should consider the type of coding conducted, whether it was broad or narrow in scope, how the codes were turned into themes, and the number and calibre of literature associated with each theme. NVivo™ can produce a cluster analysis to calculate a similarity index of coding between each pair of coded literature articles using similarity metrics known as: Jaccard's coefficient (0 = least similar, 1 = most similar), Pearson correlation coefficient (-1 = least similar, 1 = most similar) and Sørensen's coefficient (0 = least similar, 1

= most similar) (QSR, 2017). Using Jaccard's coefficient as an example for clarity of this step, the diagram in Figure 10 displays a two-dimensional diagram of the cluster analysis. The circled items are articles which have high similarities in how they were coded. The items which are further apart represent low similarities in how they were coded. The summary table below (Figure 10) displays the similarity on the Jaccard's coefficient scale.
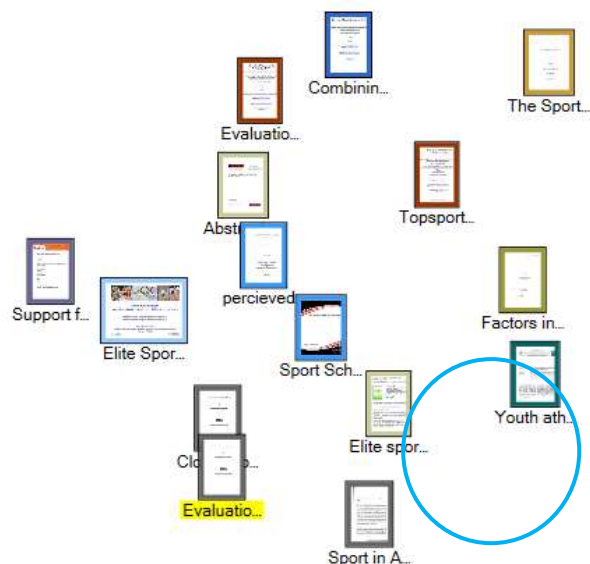
Source A	Source B	Jaccard's coefficient
Internals\\Journal articles\\Sport Sch	Internals\\Journal articles\\Spor	0.818182
Internals\\Journal articles\\Sport Sch	Internals\\Journal articles\\Spor	0.6
Internals\\Journal articles\\Sport Sch	Internals\\Journal articles\\Spor	0.583333
Internals\\Journal articles\\Sport Sch	Internals\\Journal articles\\Spor	0.583333
Internals\\Journal articles\\Sport Sch	Internals\\Journal articles\\Spor	0.571429

Figure 10. Step 7: Example of Cluster analysis of sources (literature) by coding similarity and coding summary table

As the coding process advances one would expect to see more sources clustered together in this diagram. Those sources which are far apart should be carefully reviewed to ensure relevance to the overall argument as it is being developed.

A tree map may also be useful in determining whether saturation has been reached. The "tree map" output appears as a word table with nested rectangles representing subthemes. The size of the rectangle is dependant on the number of literature items coded under that subtheme. An article can be coded to more than one subtheme. For the purpose of this demonstration, Figure 11 highlights the "tree map" of the theme "duality" and its subthemes – issues that high performance school-age athletes encounter in trying to combine sport and study.

Nodes compared by number of items coded
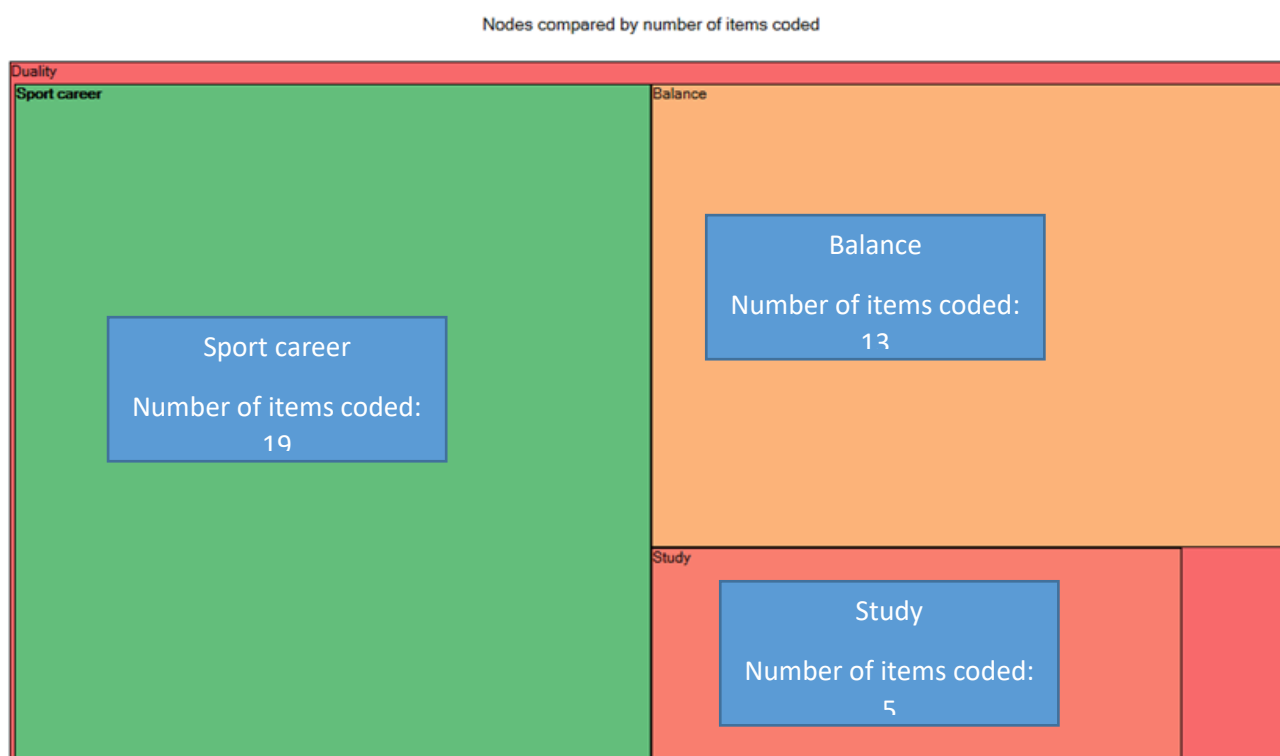
Figure 11. Step 7: Tree map matrix

As shown in the above tree map the largest rectangle is the theme with the largest number of literature items coded to it (sport career). However, the subtheme "study" only contains five coded items. In this regard, the tree map provides a more comprehesive understanding of how much of the literature is coded under each each subtheme. The greatest benefit to the reseracher in using such tree maps is to ensure they are achieving a more comprehensive coverage of their literature to assist with the development of the argument.

The researcher may want to explore similarities between articles, in which case the explore diagram may be useful. Figure12 shows three themes which connect the two articles and the theme "study" which only applies to one of them.

Figure 12. Step 7: Comparison diagram

To assist the researcher in compiling a comprehensive list of authors writing on various topics, "see also links" can be used. Such links provide the reseracher with a listing of all connected authors that focus on similar topics and are summarised at the base of the opened article. The main advantage of "see also links" is that the researcher starts collating a concise cross check to all other authors who have similar lines of argument. This is particularly helpful when writing up systematic reviews.
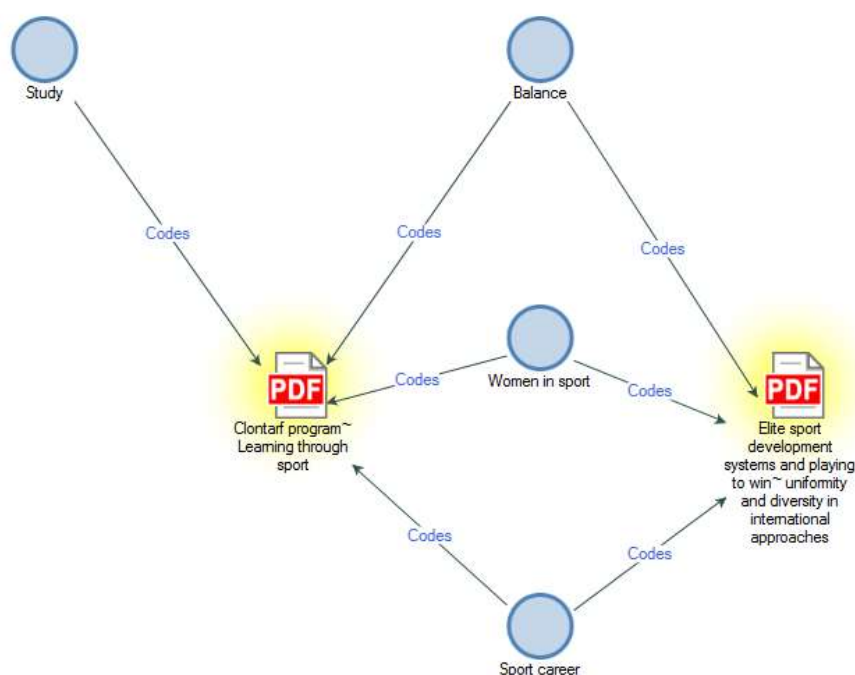
Plus 1: Write Up

At this stage, the researcher has analysed the literature and confirmed that saturation has been reached by utilising a variety of tools within the QDAS program. This helps minimize the danger of focusing solely on literature that confirms pre-existing assumptions. The automated tools within NVivo™ can highlight topics and themes which may have otherwise gone unnoticed.

The final step allows the researcher to target one theme at a time, drawing on texts to support that theme and building their reference list at the same time. As discussed in Figure 1 (N7+1, the 8 Step Pedagogy), each step is dynamic and this final step is no exception. Through the writing process the researcher constantly revisits the visualisations and codes to ensure all aspects of the analysis have been covered.

By writing up one theme at a time, a clear line of argument with supporting data can be demonstrated. Conclusions are readily verified as the researcher continues to analyse and summarise through the dynamic writing process. During review and writing, all literature can be traced back to the original source and codes contained in the NVivo™ project. Using the "NVivo™ tools" in each stage permits the rigorous analysis of literature (O'Neill, 2013). This process is displayed in Figure 13.

Framework Matrices

Name

belongingness

duality

DUALITY 1

Impact

Contains the Framework matrix of the theme "duality"

duality ✖

A : Impact of double life

As suggested by Willis (2002) as cited in Fine an Sirin (2007) the concept of duality may be of significance in the high performance shcool-age athlete

1 : literature

The opened Framework matrix illustrating how the literature on "impact of double life" is being written up.

Fine and Sirin 2007 (1)

Reference Text PDF

Opened journal article attached to the theme "impact of double life"
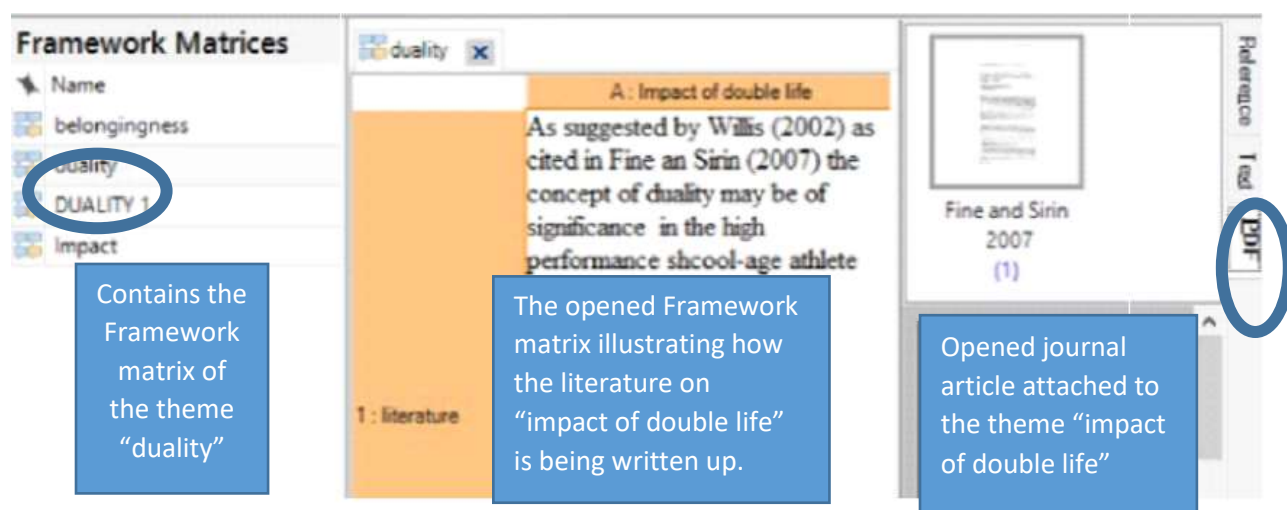
Figure 13. The 8 Step Pedagogy (the +1 step) where researchers write up their literature in the container of Framework Matrices in NVivo™.

Figure 13 illustrates the use of a framework matrix to outline the theme of "duality" and, within that theme, a sub theme of "impact of double life." This subtheme may be a section in the paper that is supported by quotes from a variety of literature sources.

All associated documents can be easily accessed keeping the writer "close" to their data, as suggested by Jackson (2015). The advantage of all associated data in the one repository is that the whole process can be paperless and accessed quickly. The researcher can cross check all facets of the themes and argument when writing. Furthermore, a report can be generated referring to summaries of the coded data. Alternatively, the researcher can export the reports, frame work matrices codes and the full range of visualisations to write up outside the NVivo program.

Conclusion

The N7+1 Pedagogy should be approached as a flexible and versatile movement through the steps in a way that accommodates for varying researcher needs and theoretical approaches. This process allows the researcher to maintain transparency in a broad analysis at the same time as allowing for in depth exploration of specific literature. While the N7+1 Pedagogy has been designed to address all the important steps in literature review writing, it is particularly useful given the volume of literature now available. Using NVivo™ as described eliminates numerous challenges in handling such vast amounts of text. Automated searches on the literature are possible with many relevant papers being captured in the search for particular phrases, words or broad terms. This streamlined approach to a literature review also supports re-visiting the sources and analysis for future projects. Different emphases can be given to searches within NVivo™, resulting in a shift in focus of the literature review as necessary. While anecdotal evidence suggests that doctoral candidates from each of our universities have been using this framework successfully, a formal research study is currently underway.

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