

Use of Bibliographic Systems and Concept Maps: Innovative Tools to Complete a Literature Review

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This article presents a process for utilizing a bibliographic system built with Microsoft Excel as well as concept maps to organize and to synthesize information that can be included in a literature review. A review of the conceptual framework behind these tools is included as well as a detailed description about how to build the system in Excel. Also discussed in this article is the importance of the literature review as a dynamic component of any scholarly work. Doctoral students usually face the challenge of writing a literature review, lacking the necessary skills to search, to organize, to analyze, and to synthesize information. Some ideas about how to build relationships among existing scholars' work on a particular topic and ideas for generating new knowledge also are discussed.

Writing a literature review is probably one of the most challenging aspects of being a doctoral student. It is not only a matter of selecting a topic of interest, but it is also a particularly challenging exercise in regard to getting all the information organized, classified, and accessible when the literature reviewer needs it most. Particular attention to details is important for a literature reviewer accurately to cite a particular researcher's work and also to find her/his own voice in the process. As a doctoral student, the literature reviewer needs to find his or her own voice to be able to contribute some perspective to the existing conversations in the academic world. According to Graff and Birkenstein (2006), it is very challenging to engage students in this type of academic discussion, particularly when they are required to make their own claims and to add something of value to the conversation. In my academic experience in Colombia, Mexico, and now in the United States, I have recognized that perhaps the greatest challenge for students is not only to be able to convey what others have previously stated, which, in most of the cases, becomes a summary of the existing literature, but also to be able to find their own voices in the conversation.

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According to Boote and Beile (2005), a high-quality dissertation, and more specifically, a good literature review, requires not only reporting results from previous research but also a critical review of the methodology. By critically reviewing the methods used by previous researchers, the reviewer will be able to synthesize information, offering a new perspective to the existing conversation (Onwuegbuzie, Collins, Leech, Dellinger, & Jiao, 2010). After the researcher has decided upon a dissertation topic and read the required articles, books, and other references, the question is how to organize all the references so that they can be used when appropriate. Even more so, the question is how to find a particular reference that the reviewer recalls reading when he/she does not remember the location or the name of that author. Let us now suppose that the reviewer has a way of tracking all the materials that her/she has read for the literature review. The question that remains is how to create a conversation among authors who actually might not be discussing a topic in real life. In other words, it is possible that the reviewer has all the key authors for a particular topic, and that in the write-up, he/she is able to provide the different perspectives about a contested topic. However, determining how to create new relationships within the existing perspectives is probably the most common challenge for many doctoral students. Unfortunately, the majority of doctoral students receive little training "in how to analyze and synthesize the research literature in their

field” (Boote & Beile, 2005, p. 5). The poor quality of literature reviews is not a unique problem for only doctoral students, but for scholars in general. Onwuegbuzie and Daniel (2005) found that 40% of the manuscripts submitted for a research journal had inadequate literature reviews, and these manuscripts were more than six times more likely than were manuscripts containing adequate literature reviews to be rejected for publication. The poor quality of literature reviews has been discussed by several authors over the years (Boote & Beile, 2005; Fink, 2009; Hart, 2005). Recently, Onwuegbuzie et al. (2010) have outlined a model for a rigorous literature review that offers a clear guide about how to select, to analyze, and to synthesize qualitative and quantitative sources.

Organizing the Information

Writing a literature review requires enormous amounts of time and effort that challenge even the organization of daily life. It is not only about reading the materials; it is more about classifying, analyzing, and synthesizing great amounts of information, and making sense of it before the writing process begins (Machi & McEvoy, 2009; Onwuegbuzie et al., 2010). Even though the topic of literature reviews seems to be popular among scholars, there are scant published works in this area offering methodological guidance about how to conduct literature reviews (Onwuegbuzie et al., 2010).

Several authors have reported that students, most of the time, only have acquired pieces of information about a particular field in a disorganized fashion. Boote and Beile (2005) remarked that doctoral students lack the bibliographic skills properly to locate and to analyze the existing literature on a particular topic. Also, they surmised that not all educational doctoral programs have high-quality standards for writing a literature review. This is clearly exemplified by the inaccurate understanding of the literature review as a summary of existing knowledge or research about a particular topic; an idea that is very commonly shared among doctoral students (Hart, 2005; Onwuegbuzie, Leech, & Collins, 2011). Further, Combs, Bustamante and Onwuegbuzie (2010) documented the need for doctoral students to find effective strategies to “organize, catalog, and abstract the large amounts of information gleaned from their searches” (p.172)

It is important to mention that by selecting books and articles related to a particular topic, the writer of the literature review is presenting a personal interpretation in the sense that there has been a selective process, which gives a certain ownership to the writer (Dellinger, 2005; Onwuegbuzie et al., 2010). However, it is not enough for the reviewer

simply to contribute to the existing conversation. There is a clear and urgent need for doctoral students, or any person aspiring for an academic career, to develop advanced skills in searching bibliography, but even more importantly, to develop ways of collecting and classifying information in a meaningful way (Boote & Beile, 2005; González, Amozurrutia & Maass, 2006), so that they advance the academic discussion with their own voices.

The process of finding and capturing information about a particular topic can be messy, and that is why having a central and unique control document is highly recommended as a good strategy for organizing, categorizing, and analyzing the information available (Fink, 2009; González et al., 2006; Machi & McEvoy, 2009; Onwuegbuzie et al., 2010). Nowadays, there are several software packages that allow the reviewer to do this; however, Excel from Microsoft offers a great option without the need to pay for an extra package.

Bibliographic System in Excel

Before sharing the particular details about the bibliographic system in Excel, I would like to discuss the knowledge behind it. I first want to give credit to the researchers at the Complex Communication Laboratory (LABCOMPLEX) at the Universidad Nacional Autónoma de México (UNAM), one of the most prestigious universities in Latin America, from whom I learned how to use this tool, and who are leaders in the field of complex thinking and cyberculture. LABCOMPLEX is seeking to promote a cyberculture that is built upon three important social processes or systems: information, communication, and research—all of them in the context of interdisciplinary work. Even though all these systems are equally important, information is the foundation of them all; through information we build new human ecologies from which the number of relationships is endless.

González et al. (2006) proposed the idea of emergent communities in which knowledge is socially constructed and shared; these ideas are all based on the systemic paradigm in which all elements are equally important and interdependent. With information systems, it is possible to build communication and cultural systems that will allow the advancement of knowledge in any field. With a cyberculture, according to these authors, it is possible to adopt new perspectives and new dynamics of interaction among researchers (González et al., 2006). In short, the idea of building information systems in Microsoft Excel is the first to take advantage of existing software for a different use from the functions for which it was originally designed. For the purpose of writing literature

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reviews, I have built my bibliographic system in Excel since I started the doctoral program in Educational Leadership at the University of North Florida. I mention this because, as will be seen later in this paper, building the system requires a lot of time and effort at the beginning of the process, which later is beneficial. I need to clarify that my bibliographic system is a simplified version of the original one proposed by the researchers at LABCOMPLEX in Mexico, but one that still encompasses its central idea.

The bibliographic system in Excel consists of six columns as follows: (a) Authors, (b) Bibliography using an appropriate style guide (e.g. American Psychological Association (APA) style, Chicago Manual of Style), (c) Type of document, (d) Quotation-including page numbers, (e) Categories, and (f) Comments (see Figure 1). The reason behind having a column only for authors' names is that when filters are used in Excel, there is a limit in the number of characters that can be used for the filters to function. In the Bibliography column, I include the full reference of the particular material in APA style so that I do not have to invest additional time citing the references correctly. Type of document is a useful column that allows the reviewer to indicate if the document is a journal article or a chapter of a book. In the Quotation column, I include direct quotations from all documents I read, including the page number(s) from which it is extracted. The reason to include direct quotations is not to use it as it is when writing the literature review (because this would lead to plagiarism), but to be able to paraphrase a particular author's words with the required precision. Probably the most important part of the bibliographic system is the Categories column. The categories are key words associated with a particular reference that will assist in classifying the information included in the system. This is when knowledge about the topic comes into play because assigning categories requires a building and creative process to structure a particular field in a way that might be nonexistent. In other words, when using categories to classify information from journal articles, as well as from books or electronic documents, the designer of the system is building her or his own voice. This is an iterative process due the fact that the chances of redefining the categories become higher as a person reads more about a particular topic (Dellinger, 2005; Onwuegbuzie et al., 2010). The process of creating categories is similar to coding and sorting qualitative and quantitative information suggested by Frels and Onwuegbuzie (2010) as an appropriate approach to conducting a comprehensive literature review. I will revisit this component of the system later on when addressing the use of concept mapping. Finally, the section for

comments is for writing notes to oneself about a particular reference for later use or even to indicate sections or references that one can use when writing the literature review.

My dissertation topic is in the area of early literacy practices among Hispanic children. When building my system, some of the categories I used were parental involvement, multicultural perspectives, literacy practices, and socioeconomic status, only to cite some topics that are shared among researchers in this field. The category called country of origin is not widely mentioned in the existing literature about my topic, but there are some authors who have suggested that this could be an important factor in determining the type of literacy practices at home among Hispanic families. By choosing to create this category, I am building my own voice to contribute to the existing discussion.

Advantages and Disadvantages of the Bibliographic System

Building the bibliographic system is time consuming, but that is part of the nature of writing a literature review or any other academic endeavor. In some cases, particularly where information is coming from books or from non-searchable PDF files, the person building the system might have to type the particular quotation needed for the system word by word. However, nowadays, there is existing software that allows one to scan documents and later convert them into Word documents (e.g., <http://www.pdfdocconverterpro.com/>). In the case of journal articles, the html version usually is available, so one can copy and paste easily directly into the system, avoiding the pitfalls of typing that could lead to typographical errors, among other problems (Fink, 2009). Before building the system, it is recommended that the person working on this project reads and highlights the relevant information in articles and books that will be later included into the system. Even though this could be seen as time consuming, it gives the reader the opportunity better to incorporate information because, later, at the point of building the system, the person will have read the same information at least twice, providing ample opportunity to analyze materials and to establish relationships among them. The process of reading and classifying information with categories also is known as constant comparison analysis, a technique suggested by Combs et al. (2010) to cluster information in groups, helping the establishment of relationships among theories, and later during the write-up of the literature review.

The main advantage of having a bibliographic system comes from assigning categories and using the filter tool. Filters are tools used to hide or to show

particular information in a spreadsheet. When the reviewer has finished the inclusion of all the references with their correspondent categories, he/she should select the whole spread sheet and, under the Home menu, select Filter (see Figure 2). By doing so, the reviewer will create a scroll down menu for each of the columns included in the system: Authors, Bibliography, Type of document, Quotation, Categories, and Comments. Most of the time, the reviewer will filter by categories and by authors. The bibliographic system captures precise ideas from different authors in a way that makes it easier to give the appropriate credit. Giving appropriate credit to the authors of a particular concept is essential in the scholarly world, as a way of showing respect for the work of others (APA, 2010). By creating a new connection among authors working on a particular research topic, the user of the bibliographic system is promoting a cyberculture because new relationships are generated that were nonexistent in the real world (González et al., 2006; Hart, 2005). Moreover, the

ability to connect previous research gives the opportunity for doctoral students to contribute to the generativity required and expected from scholars (Boote & Beile, 2005). It also promotes higher cognitive levels instead of just the repetition of what has been stated by others (Combs et al., 2010). This is when the reviewer's own voice comes into the process due to the fact that the reviewer, as the owner of the system, is building a second-level order of relationships by putting together perspectives of the world that were not necessarily in place (González et al., 2006). If we share our bibliographic systems with other people interested in the same topic, we can enrich our perspectives on education or any other field because each observer who interacts with the system will see different aspects of it. The bibliographic system in Excel allows us to structure a specific reality in a particular way and, in doing so, the system itself will structure new ways of thinking.

Bibliographic System					
Early Literacy among Hispanic Children					
Author's Name	Bibliography	Type of document	Quotation	Categories	Comments
Kummerer, S., & Lopez-Reyna, N.A.	Kummerer, S., & Lopez-Reyna, N.A. (2006). The role of Mexican immigrant mothers' beliefs on parental involvement in speech-language therapy. <i>Communications Disorders Quarterly</i> , 27	Journal article	Involving families in speech-language therapy is essential given that language develops through meaningful, reciprocal engagement with significant others in the child's sociocultural context (McLean & Snyder-McLean, 1999). P.83	parental involvement	no
Kummerer, S., & Lopez-Reyna, N.A.	Kummerer, S., & Lopez-Reyna, N.A. (2006). The role of Mexican immigrant mothers' beliefs on parental involvement in speech-language therapy. <i>Communications Disorders Quarterly</i> , 27		One of the most significant trends in special education and related services is the construction of programs, for culturally and linguistically diverse populations, that embody the sociocultural perspective (Cruzado-Guerrero & Carta, 2006; Lopez-Reyna, 1996). p.83	multicultural perspective	
Kummerer, S., & Lopez-Reyna, N.A.	Kummerer, S., & Lopez-Reyna, N.A. (2006). The role of Mexican immigrant mothers' beliefs on parental involvement in speech-language therapy. <i>Communications Disorders Quarterly</i> , 27		The effectiveness of early intervention will depend to a large extent on the provision of services that are culturally desirable and/or acceptable to the families involved (Scheffner Hammer, 1998). P.84	multicultural perspective	
Kummerer, S., & Lopez-Reyna, N.A.	Kummerer, S., & Lopez-Reyna, N.A. (2006). The role of Mexican immigrant mothers' beliefs on parental involvement in speech-language therapy. <i>Communications Disorders Quarterly</i> , 27		One approach to providing language intervention with preschool children is to teach their parents to serve as the primary intervention agents (Girolametto et al., 2002). P.84	parental involvement	no

Figure 1. Screenshot showing the Bibliographic System in Excel.

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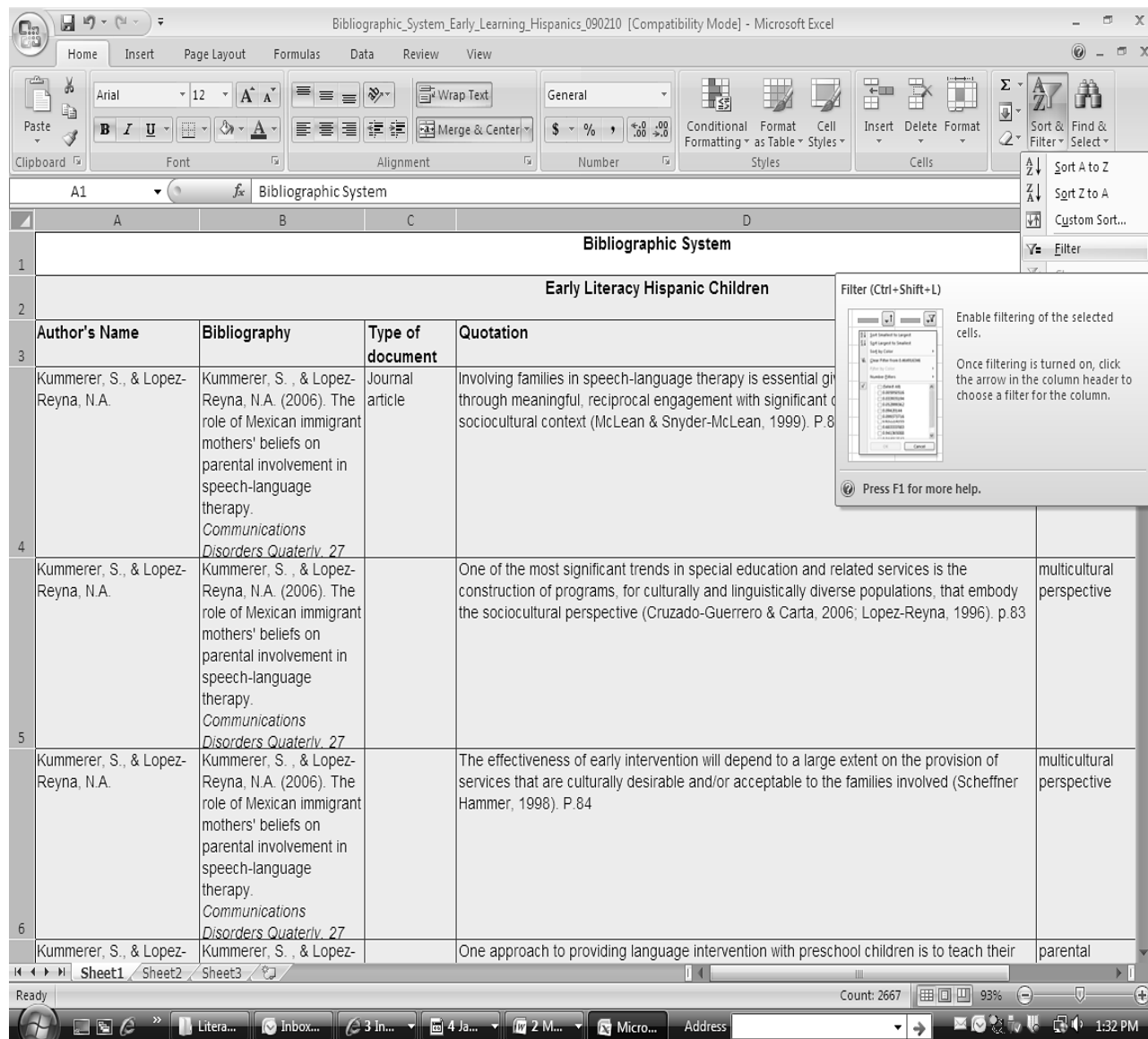


Figure 2. Screenshot showing how to use Filters.

The Use of Concept Maps

When I already had included approximately 300 references in the bibliographic system, I found new information about my topic that had been recently published. After reading the new material, I faced the challenge of presenting what I had learned from the literature to some members of my committee, and because I did not have sufficient time to include all those references in my bibliographic system in Excel, I decided to create a concept map. I used a free software program called Cmaps Tools (Novak & Cañas, 2008), created by the Florida Institute for Human and Machine Cognition (IHMC) under the leadership of Joseph Novak and Alberto Cañas.

According to Novak and Cañas (2008), concept maps are powerful tools not only for organizing and structuring knowledge, but also for promoting meaningful learning. By structuring knowledge in concept maps, it is easier to identify and to build new knowledge and new meanings. A concept map promotes creativity because the person building it is creating meaningful relationships, knowledge that can later be incorporated into the existing schema of the designer, which makes learning easier (Eggen & Kauchak, 2010; Hart, 2005). When undertaken in an appropriate way, concept maps can promote “high levels of cognitive performance” (Novak & Cañas, 2010, p. 13). Concept maps also are useful for capturing and archiving large volumes of knowledge or information (Novak & Cañas, 2010).

Cmpas tools is a great software program for building maps easily because it allows the user to link various types of files into a particular concept (e.g., text, presentations, maps, tables, images, and websites), which makes it richer in the sense that people can create knowledge models about a particular topic without being limited to a single map (Novak & Cañas, 2008). The other interesting aspect of using this software programs is that it allows the reviewer to archive the concept maps on the Internet so that others around the world can see a map and contribute to it. Also, the reviewer can have access to it from any location. This idea is consistent with the one promoted by people at the LABCOMPLEX in the sense that they both pursue creating knowledge-emergent communities in which knowledge is socially constructed (González et al., 2006)

I built my concept map about the topic of early literacy based on a focused question (see Figure 3), as suggested by Novak and Cañas (2008). According to these authors, a good concept map is one that is built around a particular question because it provides a clear context for what it is included in the map. In other words, concept maps that do not answer a particular question tend to be too broad, which goes against the idea of establishing meaningful relationships among related elements. The process of building a concept map around a focus question is iterative because the question guides the search for information, and the extracted information reshapes the question constantly or creates new questions (Novak & Cañas, 2010).

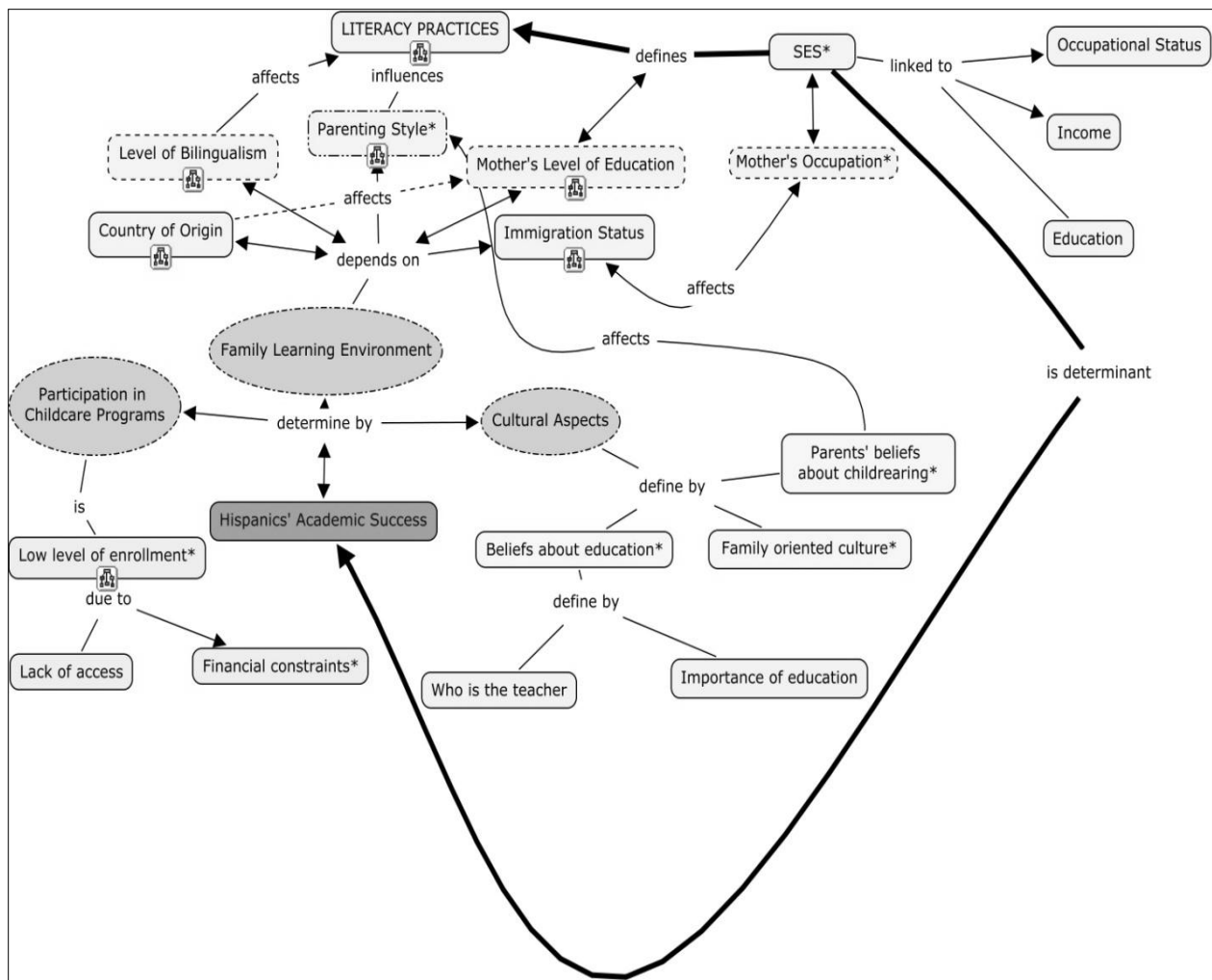


Figure 3. Concept map about early literacy.

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Integrating the Tools

When I used the two tools together, the bibliographic system and the concept map about early literacy, I was faced with the challenge of how to integrate the information contained in both tools. This is when I discovered that the words used in the concept map were indeed the categories I needed to classify all references included in my bibliographic system. What I first decided to do was to include all new references that were represented in the concept map in the bibliographic system. In addition, I revisited the existing categories in the bibliographic system and changed some of them, based on the words included in the concept map. The new categories became the key components in the conceptual framework of my literature review, and even more so, key elements for the design of my study.

The most exciting part of using these two tools occurs when the reviewer actually begins to write the literature review. The best tool for that, at least for structuring the literature review itself, is to use the concept map. Selecting each element included in the concept map and filtering the system in Excel according to these criteria will provide the reviewer with all information related to a particular topic, making the writing process much easier. The reviewer then will have all pertinent references. After reading what all the authors included in the bibliographic system have written, it becomes easier to write a synthesis of the existing discussion about it. In this way, the reviewer, as the writer, can give credit to the authors who have proposed a particular concept without having to dig into the reviewer's memory or pile of articles, and the reviewer also can avoid unintentional plagiarism. By using these two tools the reviewer will be in a better position to find her/his own voice and the chances of plagiarizing or only summarizing what has been written is lower.

Advantages of these Tools

The existence of plagiarism is a recurrent problem in academia (Ercegovac & Richardson, 2004; Hulsart & McCarthy, 2009), and I believe that one of the reasons behind this problem has to do with the lack of a system to match references with authors. As doctoral students, we all have experienced this: after reading numerous articles and books about a topic, we assimilate terms and concepts, making it difficult to remember to whom to give credit. The importance of giving credit to people who have proposed particular concepts is emphasized by APA not only as a way to respect what others have written previously but also as a great path to finding our own contribution to a specific field.

The use of the bibliographic system in Excel allows the user clearly to identify particular ideas of a specific researcher or author; it also provides a great opportunity for creativity because it promotes new relationships among existing authors interested in the same topic. By building those relationships, the writer is able to find his or her own voice in the sense that his or her own perspective becomes unique. After summarizing, analyzing, and synthesizing the literature, the writer can make supported claims about that literature (Boote & Beile, 2005), instead of just writing an annotated bibliography, a common mistake found in dissertations (Hart, 2005). If the same references included in the bibliographic system are used by another person, a different perspective will appear, and that is part of building emergent communities of knowledge wherein several points of view are shared (González et al., 2006).

If the bibliographic systems in Excel are shared among a group of doctoral students or scholars interested in the same topic, we can promote a new perspective about research conducted collectively, in which researchers not only receive credit for the work they have undertaken but also build a collective perspective that can contribute to solving social issues (González et al., 2006).

When writing the literature review itself, each tool plays a different role. The concept map functions as the outline for the literature review, whereas the bibliographic systems group references in categories. During the writing process, the writer can color code each reference that has been used so that it becomes easier to look for new information related to a particular topic. The richness of the literature review increases by using the bibliographic system because the writer easily can track what has or has not been included and even make notes about how a particular reference can be used later in additional sections.

When using the two tools, the writing process is faster because all the required information is already consolidated in one system that is easily accessible. Many other options exist for integrating these two tools such as creating links with the original articles in PDF files, which can be conducted with both tools. Each user can explore many other options to discover how having a consolidated system enriches the researcher's perspective on the topic and provides new solutions for old problems.

In addition, the combined use of the bibliographic system with concept maps could contribute to a better understanding of the literature review as a dynamic chapter that evolves from the proposal to the dissertation itself, and not as a "static artifact" (Boote & Beile, 2005, p.11). Writing a literature review, as part of any research endeavor, needs to be understood as an "iterative, complex, contradictory, ambiguous, and hence extremely

messy” process (Onwuegbuzie et al., 2010, p. 174). The fact that the dissertator is able to have an organized system with all references also facilitates the development of a rationale for the selection of particular articles as part of the literature review (Frels & Onwuegbuzie, 2010).

Conclusion

Building the two tools and integrating them is time consuming as I mentioned before. However, the allocation of this time is rewarded at the point of writing the literature review, which could take only a few weeks. My personal experience in using these two tools has been extremely valuable. Not only did I write the first draft of my literature review in approximately two weeks, but I also found the process of making adjustments to be easier because there is a sense of ownership that comes from using the two tools. The use of the bibliographic system in Excel and the concept maps helps the reviewer to create a good synthesis of the existing research, generating new knowledge and also contributing to the generativity expected from scholarly work (Boote & Beile, 2005). I highly recommend that doctoral students and professors use these two tools because their perspectives on their research interests can be enriched greatly, and with more powerful knowledge, I am certain that we can find better solutions to educational problems.

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