


# Concept Mapping: A Dynamic, Individualized and Qualitative Method for Eliciting Meaning

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## Abstract

The purpose of this theoretical article is to explore the use of concept mapping as a qualitative research method that is represented as a form of multimodal communication. This framework strives to move mapping beyond quantitative analysis by inserting art and humanness into the process. This proposed framework provides a means to highlight the ways in which people learn, understand, and interpret the world around them. Three categories for understanding have been identified by the authors to help individuals create, interpret, and understand qualitative concept maps. These categories include the following: Voice: Tri-directional Voice and Mutual Absorption; Detail in the Parts & Recognition of the Whole: Uniqueness, Aesthetic Distance and Emplacement; and Sensory Experience: Intellectual + Emotional Investment and Humanness. Each of these categories is interconnected, and informs each other in a dialectical way, therefore creating a piece of visual data with which the participant, researcher and audience can interact.

## Keywords

concept mapping; research; qualitative; art; communication; thematic analysis; North America

## Introduction

Concept maps are defined as tools to assist individuals in visualizing the journeying nature of a concept's development (Butler-Kisber & Poldma, 2010; Hunter, Lusardi, Zucker, Jacelon, & Chandler, 2002). It allows for a visual representation of movement from the foundational tenants of an idea to its end product and future developments (Gallenstein, 2005; Hunter et al., 2002). Concept mapping uncovers the natural complexities embedded in learning and provides a visual representation of how these nuances communicate with one another. This article explores the history of concept mapping and highlights its importance as an educational and research method. It will elaborate on the benefits of moving toward a more qualitative representation of concept mapping and will propose a new framework for the map's construction, analysis and interpretation.

## History of Concept Mapping

Concept mapping is a visual method that was created by Novak (1990a; 1990b) in an attempt to understand changes in children's knowledge of science. Concept maps are described as "graphical tools for organizing and representing knowledge" (Novak & Cañas, 2008). Rooted in education, concept mapping has been utilized in the fields of nursing and allied health care to enhance critical

thinking skills and meaningful learning (Aberdeen, Leggat, & Barraclough, 2010; Burke et al., 2005; Miller-Kuhaneck, Bortone, & Frost, 2007; Passmore, 2013). Traditionally, concept maps include concepts that are usually enclosed in a circle or box arranged in a hierarchical fashion with the most general concept at the top of the map and the more detailed descriptions below (Eppler, 2006; Moon, Hoffman, Novak, & Cañas, 2011; Passmore, 2013). Relationships are represented by unidirectional or bidirectional arrows between concepts with linking words or phrases that form a meaningful statement (Moon, Hoffman, Novak, & Canas, 2011; Novak & Cañas, 2008; Passmore, 2013). The focus question acts as a point of reference from which the concept map is generated. It can pertain to some situation or event that the researcher is trying to better understand and creates the context for the concept map (Moon et al., 2011; Novak, 1990b; 2010; Novak & Cañas, 2008). Mapping research findings can help to build a logical chain of evidence as well as

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conceptual and theoretical coherence (Butler-Kisber & Poldma, 2010; Hunter et al., 2002).

## Epistemological and Methodological Foundations

Concept mapping is informed by Ausubel's (1963, 1968) Assimilation Theory, which suggests that meaningful learning occurs when there is an assimilation of new concepts into one's existing knowledge base or "cognitive structures." (Ausubel, Novak & Hanesian, 1978) To ensure meaningful learning, the topic must be conceptually clear and presented with examples that are relatable to the learner's prior knowledge (Moon et al., 2011; Novak, 1990a). The learner must also have a foundation of basic understanding related to the topic and finally, the learner must choose to learn in a meaningful way (Akinsanya & Williams, 2004; Chiou, 2008; Novak, 1990a). "Meaningful learning is the foundation of human constructivism which is both a psychological and epistemological phenomenon" (Novak, 1990a, p. 32).

The epistemological foundations of concept mapping arise from the constructivist paradigm and are closely linked with Vee Diagrams or Vee Heuristic developed by Novak's colleague Gowin (1970, 1981). Gowin's Vee diagrams were created to illustrate the methodological and conceptual elements that interact in the process of new knowledge construction (Gowin, 1970, 1981; Gowin & Alvarez, 2005; Novak, 1990a; Novak & Cañas, 2006, 2008). Vee diagrams help individuals comprehend the structure and meaning of the knowledge that they seek to understand (Gowin & Alvarez, 2005; Novak & Gowin, 1984). They are arranged in a "V" and highlight the underlying conceptual, theoretical and methodological assumptions that are required to construct new knowledge informed by the focus question (Gowin & Alvarez, 2005; Novak, 1990b; 2010; Novak & Cañas, 2008).

Concept mapping and Vee diagrams are founded on the understanding that knowledge is constructed among individuals. The constructivism paradigm views meaning as constructed by individuals interacting and engaging with the world they are interpreting (Creswell, 2014; Crotty, 2003). Meaning is therefore seen as subjective, as are the concept maps that are created in response to understanding a particular question or phenomenon. Concept maps are subjective representations of one's understanding of a concept and are most useful to the person who creates them (Conceicao & Taylor, 2007; Miller-Kuhaneck et al., 2007). Concept mapping encourages the construction of knowledge in a meaningful way by facilitating the creative interaction between the individuals, their current cognitive structures and new information.

## Evaluation of Concept Maps

Historically the evaluation of concept maps has compared one map with another. It evaluates the "correctness" of a map by finding commonalities and quantifying the number of concepts presented and their relationship to one another (Davies, 2011; Eppler, 2006; Novak & Cañas, 2008). Novak and Gowin (1984) developed a scoring protocol for analyzing concept maps that evaluates an individual's map based on quantitative measurements. The number and the arrangement of concepts and the validity of their linking phrases are pivotal markers in how well an individual is learning and/or understanding a phenomenon (Chiou, 2008; Conceicao & Taylor, 2007; Kinchin, Hay, & Adams, 2000). A potential barrier to evaluating a concept map solely through a quantitative approach limits the descriptive richness and narrows the opportunity to highlight the insights of the participant and researcher (Kinchin, 2013; Trafimow, 2014). In addition, comparing maps and counting concepts attempts to generalize how individuals learn and disregards the meaning behind the creation of the map. Establishing a hierarchy among concepts and instituting validity between linkages may cause the researcher to overlook important ideas embedded within the map and minimizes the significance of the individual's perspective (Hay, 2007; Kinchin, 2013; Kinchin et al., 2000). A body of literature is starting to emerge that explores the use of concept maps as a qualitative research methodology. Through highlighting the individualized process of concept mapping, it offers the opportunity to emphasize the humanness and complexity that is inherently embedded within health care research.

## Developing a New Framework

### *Multimodality and Art*

Accompanying the steps and processes associated with constructing a sound concept map is an element of creativity. The manner in which an individual constructs his or her concept map gives clues to his or her values, beliefs and overall approach to research and learning (Butler-Kisber & Poldma, 2010; Wheeldon & Faubert, 2009). Concept maps allow the researcher to interact with the data, uncover new relationships and view the information from a different perspective.

The creative component of concept mapping appeals to the different senses of the individual allowing for a more holistic learning experience (Butler-Kisber & Poldma, 2010; Taylor & Littleton-Kearney, 2011). Concept maps illustrate a form of multimodal communication that allows participants to find and share their voice in new ways. Multimodal communication encourages the interaction of multiple semiotic resources such as language, art and photography (Kress

& van Leeuwen, 2001, Pink, 2011b; Rose, 2012). This approach to communication allows for the exploration of theories derived from arts-based disciplines to create new pathways of understanding qualitative data. Eisner (2008) suggests that art is another form of discourse and can be recognized as a specialized form of knowledge. Art as a form of discourse articulates cultural values and beliefs, sheds light on society structures and allows self-expression beyond the restrictions of textual language (Eisner, 2008; Nead, 1988; Pink, 2011b; Rose, 2012).

This article seeks to explore concept mapping as a qualitative research method that is represented as a form of multimodal communication. This framework strives to move mapping beyond its structure and quantification that has been previously discussed in its historical beginnings and seeks to insert art and humanness into the process. The intention is to provide another way to illuminate the ways in which people learn, understand and interpret the world around them.

Throughout the development of the proposed framework, the researchers were aware of the necessity to have it strongly rooted in a qualitative methodology. Methodologies encompass both philosophy and methods (Carter & Little, 2007; Finlay & Ballinger, 2006) and lay the foundation for the development of a cohesive research project (Howell, 2013). It is therefore necessary to explicitly state the epistemological underpinnings of the framework as it guides the production of the concept mapping method. The proposed concept mapping framework is derived from the constructivist–interpretivist paradigm which recognizes that the construction of knowledge has multiple meanings and subjective realities (Creswell, 2014; Denzin, 1994; Finlay & Ballinger, 2006). The understanding derived from this form of concept mapping is within the interpretivist tradition and highlights the way in which “our perceptions and experiences are socially, culturally, historically and linguistically produced” (Finlay & Ballinger, 2006, p.19).

In this proposed framework, the researchers are embedded within the phenomenon they are studying and are informing and are informed by the participant(s) and the mapping process itself. Reflexivity is therefore an important skill that needs to be implemented throughout the mapping process. It allows researchers to provide a transparent methodological account of the co-construction of knowledge during the research process and deepens their understanding of how they collect, select and interpret data based on their previous understandings, personal values and beliefs (Creswell, 2014; Denzin, 1994; Finlay, 2002; Finlay & Ballinger, 2006).

### Categories of Understanding

The proposed framework was informed by the work of Bresler (2006), Pink (2009) and Rose (2012). Each of

these researchers offers unique insights into various arts-based qualitative research methodologies and they illuminate significant aspects of visual methodologies that have informed this proposed framework. The work of Bresler (2006) blends the use of artistic experience with qualitative research throughout the data collection, data analysis and writing process. This illuminates the interconnected nature of arts-based inquiry throughout the qualitative research study (Bresler, 2006). The work of Bresler (2006) also highlights the tri-directional voice embedded within arts-based and qualitative research. This concept offers a unique perspective on the importance of qualitative arts-based inquiry on the participant’s understanding of themselves beyond conveying meaning to the researcher. The work of Pink (2009) was integrated into the concept mapping framework because of her focus on the sensory experience of qualitative research. Pink (2009) argues that a multisensory approach is necessary in learning about, understanding and meaningfully representing complex topics in health care research. The work of Rose (2012) situates visual data as having the same value as information obtained from written text and numerical calculations. In addition, Rose (2012) provides strategies for interpretation of visual materials that are explicitly linked to strong theoretical and methodological sound foundations in qualitative research. Refer to Table 1 for the key concepts elicited from the work of Bresler (2006), Pink (2009) and Rose (2012).

It is important to acknowledge the dialectical relationship between the work of these three authors. The commonalities and connections between their work were used to expound the categories for constructing, analyzing, and interpreting qualitative concept mapping. These categories were identified through multiple readings of their books and research papers by the three researchers searching for common themes. These themes were independently recorded by each researcher, then further discussed and agreed upon collectively. Refer to Table 2 for the connections uncovering the categories for understanding. The themes and their associated descriptions attended to criteria for worth and rigor in qualitative research through demonstrating multivocality, transparency, self-reflexivity, thick description and aesthetic merit (Tracy, 2013). The collective themes were highlighted and assimilated into the following categories for understanding that form the foundation of this proposed framework. The three categories include:

1. Voice: Tri-directional Voice and Mutual Absorption;
2. Detail in the Parts & Recognition of the Whole: Uniqueness, Aesthetic Distance, and Emplacement; and
3. Sensory Experience: Intellectual and Emotional Investment and Humanness.

**Table 1.** Key Concepts Elicited From the Work of Bresler (2006), Pink (2009), and Rose (2012).

| Bresler (2006)   | Pink (2009)  | Rose (2012)   |
|--|--|---|
| Tri-directional relationship   | Voice and the message of the participant   | Human beings are produced not just born: greatly influenced by their experiences (p. 141)   |
| Connection to phenomenon   | Interconnection of the senses in a dynamic and non-hierarchical relationship (p. 2)                                      | Discourse can be in the form of art work and other multi-modal works (p. 142)   |
| Connection to self   | Developing ways of knowing by sharing in spaces and places with the participants and experiencing things together (p. 2) | One's culture influences the artwork/ visual methods that are produced (p. 142)   |
| Connection to audience (p. 53)   | Opening up opportunities for multiple ways of knowing (p. 8)   | Vision and visuality; balance between what the eye actually physically sees and what our culture/experiences etc. have shape what we <i>do</i> see (p. 2)                       |
| Soft boundaries and flow of ideas and concepts (p. 53)   | Drawing on a family of methods (p. 9)  | multimodality in images and the importance of written text, photographs, drawings, multi-media representations etc. in informing understanding and knowledge production (p. 11) |
| Doing and Becoming through esthetic encounters (p. 54)   | Collaborative process between the researcher and the participant (p. 10)   | Site of audiencing: different people will understand and interpret different meanings from the image (p. 22)  |
| Empathetic understanding through research role of emotion in research and a blending of the affective and the rational (p. 54) | Weaving of creative discourses and then effecting the way that people understand the world around them (p. 12)           |   |
| Aesthetic distance   | Focus on everyday practice such as housework, laundry, gardening etc. (p. 15)  |   |
| Voice and a fusion of horizons (p. 55, 57)   | Body as a place of knowing through the senses (p. 24)  |   |
| Taking research to the next level (p. 57)  |  |   |
| Researcher is a part of the learning process/change (p. 59)  |  |   |
| Links to arts-based practices and ways of knowing  |  |   |

Source. Bresler (2006), Pink (2009), and Rose (2012).

These categories are not isolated from one another but instead they are interconnected and inform each other through a symbiotic relationship. The conceptualization of soft boundaries allows for the flow of ideas among these domains and mimics the relationship between research and art-making (Bresler, 2006; Irwin & de Cosson, 2004). This proposed framework highlights the importance of arts-based inquiry and regards artistic practices as significant forms of scholarly inquiry (Bresler, 2006; Finley & Knowles, 1995; Fox & Geichman, 2001; Sullivan, 2005). Therefore, a blend of arts-based and qualitative research creates a new platform for the exploration of concept mapping and its use in health care research.

### Voice

The voice of the participant should be of primary importance during the concept mapping process. How the participant finds his or her voice and shares his or her story is a unique and individualized process (Banks, 2009; Bresler, 2006; Rose, 2012). There are many elements of a participant's voice that need to be considered when constructing, analyzing and interpreting a concept map. The researcher, participant and audience voice can be interchangeable depending on the intent of the mapping experience.

*Tri-directional voice.* The tri-directional voice refers to the dialogical relationship that evolves between the individual,

the concept map and the audience (Bresler, 2006). In visual methodologies, audiencing is referred to as the process by which an image's meanings are interpreted and understood by individuals in various contexts (Banks, 2009; Rose, 2012). In this proposed framework, the researchers extend the audiencing inward and recognize the individual as a part of their own audience. This is because the communication (or voice) that develops within the individual facilitates a change of self and promotes learning (Bresler, 2006; Dewey, 1934; Drew & Guillemin, 2014). Concept mapping is a medium through which people come to understand more about an event and about themselves. This change of self re-shapes the meaning of the phenomenon that is being studied, and offers the participants an opportunity to "re-see" the significance the experience and the mapping process offer them (Bresler, 2006; Butler-Kisber & Poldma, 2010; Dewey, 1934). Through this process of "re-seeing," participants develop an artistic expression of self-discovery (the concept map) and their voice resonates on both an individual and a social level.

*Mutual absorption.* Mutual absorption is the process of intense dialogue between the audience and the visual method (Armstrong, 2000; Lapum, Ruttonsha, Church, Yau, & David, 2012; Rose, 2012). It is characterized by a deep open-ended relationship where the audience is engaged with the concept map. This engagement occurs when they attempt to understand the perspectives of the participants, which are expressed through the map while

**Table 2.** Connections Uncovering the Categories of Understanding: Voice; Detail in the Parts and Recognition of the Whole and the Sensory Experience.

| Category of Understanding Derived From Connections  | Themes (Connections) That Inform Category of Understanding  | Connections Across Authors Bresler (2006), Pink (2009), and Rose (2012)   |
|---|---|---|
| Voice<br>Tri-directional relationship<br>Mutual absorption  | Multiple ways of understanding<br>Direction of the voice<br>Shared understanding<br>Leading the audience to a new understanding<br>Reflexivity<br>Connection to the self, the audience, and the phenomenon<br>Flow of voice and ideas | The multiple ways in which the voice of the participant impacts understanding of the concept map. Different people bring their individual interpretations. Voice flows between audiences.<br>Voice is directed at the self (to inform learning), the researcher (to inform shared understanding), and a larger audience such as the reader (to inform learning and understanding).<br>The voice of the participant, which is understood through the map, creates a shared understanding between themselves, the researcher, and the larger audience.<br>Through concept mapping the voice of the individual can be “heard” through a medium that demonstrates visually the complexity of the participant’s thought process.<br>Weaving of multiple discourses to form new understandings (fusions of horizons). Importance of acknowledging multiple ways of knowing.<br>Ongoing reflexivity regarding individual and shared understandings between the participant, researcher, and larger audience. |
| Detail in the parts and recognition of the whole<br>Uniqueness<br>Aesthetic distance<br>Emplacement | Physically created and represented<br>Individuality in process of construction of maps<br>Creating new understandings<br>Introspection and action<br>Balance between sight and insight<br>Multimodality                               | The way in which the map is created reflects the individual who created it—uniqueness lies just as much within <i>how</i> the map is created as in <i>what</i> is contained within the map.<br>Drawing on methods that represent the individual ways in which people communicate their thoughts, feelings, and insights. No hierarchy exists between different forms of knowledge production.<br>Doing and becoming through aesthetic encounters.<br>Iterative process between how one interprets the map, and how their perceptions maybe changed due to the process of critical reflection.<br>Vision beyond seeing. Insight into how one’s culture/ experiences shape what is and how it is understood.<br>Human beings are produced not just born. People are influenced by their experiences, and it is through these interactions that people develop an understanding of themselves and the world around them.   |
| Sensory experience<br>Intellectual + emotional investment<br>Humanness                              | Whole body experience: Interconnected<br>Blending of the affective feeling and the rational thought<br>Impact and meaning<br>Shared spaces  | Empathetic understanding through the role of emotion in research and how it can develop new pathways of understanding.<br>Research in health care should not be sterilized of emotion—instead it plays an active role in establishing meaningful connections.<br>Interconnection of the senses through a dynamic and non-hierarchical relationship. Not placing priority on sight or sound—participants’ other senses maybe more acute in their understanding of a phenomenon (e.g., visually impaired, autism spectrum disorder [ASD])<br>Taking research to the next level by inserting humanness, which causes an impact and highlights meaning in health care research.<br>Developing ways of knowing by sharing in the spaces and places with the participants and experiencing things together.   |

Source. Bresler (2006), Pink (2009), Rose (2012).

Note. The categories of understanding were derived from the themes revealed from the works of Bresler (2006), Pink (2009), and Rose (2012).

being aware of their own personal values and beliefs. The perspectives of the audience and the participants may be very different from one another (Armstrong, 2000; Bresler, 2006; Drew & Guillemin, 2014). Gadamer (1992) describes this process as the discovery of others' horizons. It is the process of acknowledging and respecting other people's ideas through an interactive and open-ended dialogue that enables the expansion of the one's self.

Throughout this process, the audience needs to recognize and acknowledge their own subjectivities that have developed through past experiences, their culture, their values and beliefs (Pink, 2009, 2013). This reflexivity allows the audience to position themselves along a continuum of understanding in respect to the participants' perspectives producing "horizons of understanding" (Bresler, 2006; Finlay, 2012; Gadamer, 1992, p.306-307). This space acknowledges the similarities and differences between the audience and the participants' viewpoints, and facilitates the "fusion of horizons" between the research participant's voice (message) and the intended audience's understanding (Bresler, 2006; Finlay, 2012; Gadamer, 1992, p.306-307).

A concept map is a visual image that facilitates an interactive relationship with its audience. Following pathways and connections allows the audience to become absorbed in the map and in turn, the map becomes absorbed into the audience (Armstrong, 2000; Lapum et al., 2012; Rose, 2012). This mutual exchange of information strengthens the methodological underpinnings of this framework, which recognizes that knowledge is interpretive and co-constructed. Through this reciprocal relationship, new knowledge is formed and with communicative sharing, it can become a part of cultural knowledge (Baker, Quennerstedt, & Annerstedt, 2015; Bresler, 2006).

Images are interwoven in our cultures, societies and personal narratives; therefore, it is important to recognize that concept maps can have various meanings in different contexts (Drew & Guillemin, 2014; Pink, 2009, 2013). How the audience (including the individual) sees and interprets the map through their own cultural lens affects the meaning(s) that they absorb and pass on to others. Qualitative concept maps encourage mutual absorption in turn facilitating the exchange of knowledge that is unique and individually meaningful.

### *Detail in the Parts and Recognition of the Whole*

This framework emphasizes the need for researchers to recognize and appreciate the details of concept maps, while respecting how each map contributes to a larger body of knowledge (Bresler, 2006, Drew & Guillemin, 2014; Rose, 2012). It takes conscious effort on the part

of the researcher to look at each element of the participant's map and refrain from habitually scanning over details. Concurrently, the researcher must take a step back and find common themes embedded within the maps, and link the visual data together to achieve a higher level of understanding (Armstrong, 2000; Bresler, 2006; Pink, 2013).

*Uniqueness.* As individuals interact and construct the world around them, they develop their own unique and personalized understanding of various phenomena (Denzin, 1994; Finlay & Ballinger, 2006). The manner in which one person interprets a situation can be very different from how another individual ascertains meaning from the same event. This variability is embraced and celebrated in qualitative concept mapping. As researchers, we attempt to understand phenomenon based on the meanings that people bring to them (Creswell, 2014; Denzin & Lincoln, 2005; Finlay & Ballinger, 2006). Uniqueness is embedded within the details of an individual's concept map. These details encourage a connection between the voice of the participant and the audience. For example, "the story of Anne Frank reaches us in ways that the number 'six million' does not. A focus on the individual allows for a noticing, a perception, and a connection" (Bresler, 2006, p. 57). This dialogic connection with the uniqueness of a participant's concept map encourages the researcher to move beyond his or her preconceptions and expand his or her conventional interpretations, thereby, generating new and meaningful knowledge (Bresler, 2006; Butler-Kisber & Poldma, 2010; Corbin & Strauss, 2008).

*Aesthetic distance.* Aesthetic distance is defined as the distance between the audience's reality and the fictional reality created by a visual image (Bullough, 1912; Cupchick, 2002). It is a position that is centrally located between excessive distance (withdrawn from the image) and insufficient distance: being so close to the image that the audience interprets it as a part of reality (Bresler, 2006; Cupchick, 2002). It allows the audience to appreciate the voice and the unique story of the individual while being cognizant of their own values and beliefs. Aesthetic distance is important in concept mapping because it enhances empathetic understanding by establishing a sincere connection between the audience and the map (Bresler, 2006). Empathetic understanding involves an emotional connection between the researcher, participant and the audience (Gair, 2012; Lapum et al., 2012; Weber, 1949). Keen (2006) referred to this relationship as a tri-directional empathy bond that brings authenticity and humanness to the research process. The tri-directional nature of the empathetic bond created through aesthetic distance mirrors the complexity of the tri-directional voice of the participant.

*Emplacement.* The sensuous interaction between the body, the mind, and the environment of both the researcher and the participant in the creation of meaning is defined as emplacement (Howes, 2005; Hurdley & Dicks, 2011; Pink, 2009). Pink (2009) describes emplacement as a concept that advances the concept of embodiment by recognizing the body as a part of the environment. “The body provides us not simply with embodied knowing and skills that we use to act on or in that environment, but that the body itself is simultaneously physically transformed as part of this process” (Pink, 2011a, p. 347).

Through the mapping process, the individual may experience physical changes related to the creation, analysis and interpretation of a map. Cognitive changes can be evident in learning and through the development of new pathways of understanding. Physical and emotional expressions of self can occur through the development of a concept map that connects experiences that are sensitive or challenging. It is through acknowledging these interactions during the mapping process that one can deepen his or her understanding of how someone creates a concept map and utilizes it as a part of his or her learning and/or reflexive experience.

### *Sensory Experience*

Concept maps elicit visual data for analysis and interpretation, however, the authors propose that concept maps offer an opportunity for the participants and the researchers to use their multiple senses throughout the mapping process. The use of all the senses is fundamental to how we learn and understand the world around us (Case-Smith, Law, Missiuna, Pollock, & Stewart, 2010; Pink, 2009, 2011b). The senses are seen as interconnected and concept maps are created as a piece of visual data for the participant and the audience to interact with. In creating and analyzing maps, individuals physically engage with the mediums the maps are created through, they may listen to music that acts as a catalyst for creative thought, or eat the salty snack that they always reach for when trying to work through a difficult task. It is the fundamental understanding that people experience their world through the integration of sight, smell, taste and hearing; and these multiple senses play an integral role in how they perceive the world around them (Pink, 2009). Acknowledging the importance of the sensory experience in the construction of knowledge opens new pathways of exploration and understanding in qualitative research (Ingold, 2000; Pink, 2006, 2009; 2011b, 2012).

*Intellectual and emotional investment.* Throughout the process of creating, analyzing and interpreting qualitative concept maps, there is an interconnection between the intellectual and emotional elements of an individual.

Emotions are constructed of various sensorial experiences. Emotional learning or emotional intelligence embraces emotional awareness in relation to the self and others (Akerjordek & Severinsson, 2007; Gilbert, 2010; Matthews, Zeidner, & Roberts, 2012). It fosters a deeper understanding of personal identity and facilitates optimal learning and development. Emotional intelligence is based on self-awareness, motivation, self-regulation, empathy and adeptness in relationships (Akerjordek & Severinsson, 2007; Goleman, 1995; Matthews et al., 2012). It is a powerful and interactive relationship between cognitive understanding and emotional engagement that brings meaning and relevance to qualitative concept mapping. This marriage between the analytical and the creative process creates a rich space where new learning can occur. Sullivan (2005) describes how the science of sight and the creativity of the eye mirror the relationship between the practices of the scientist and those of the artist. Concept mapping allows the individual to adopt the roles of both the scientist who is an analytical problem solver and the artist who expresses the self through creative mediums. Concept mapping is an outward response to an event that is experienced internally (Drever, 2002; Kinchin, 2013; Pink, 2009), that draws on both intelligence and emotion with the purpose of producing meaningful learning.

In qualitative research the researcher is seen as “a central figure who influences, and perhaps actively constructs, the collection, selection and interpretation of data” (Finlay & Ballinger, 2006, p. 6). Researcher subjectivity is seen as an opportunity rather than a problem (Finlay, 2002; Trafimow, 2014) and celebrates the co-construction of knowledge among the participants, researchers and the audience (Bott, 2010; Trafimow, 2014). Subjectivity involves the linking of intellect and emotion. It helps to shape perceptions and interpretations and enhances the way in which the mapping process resonates with the participant, the researcher and the audience (Bresler, 2006; Pink, 2009). It can be seen as enabling and facilitating a mutual process of emotional attunement and the sharing of subjectivities (Coburn, 2001; Pink, 2012). These points of conjunction that occur between the researcher, the participant and the audience bring a sense of “human sameness” (Coburn, 2001, p. 306) through the intellectual and emotional experiences of life events.

*Humanness.* Learning how to see and understand the message that the person behind the concept map is trying to share is an essential component to this proposed framework. The power imbalances that are embedded within the researcher-participant relationship need to be negotiated throughout the inquiry process. Ideally an egalitarian relationship will be constructed between parties, stressing

the acknowledgment of one's equal right to contribute to the generation of knowledge (Ben-Ari & Enosh, 2013; Karnieli-Miller, Strier, & Pessach, 2009). It is through the development of a respectful and understanding connection between the researcher and the participant that the element of humanness behind the concept map can be truly appreciated (Ben-Ari & Enosh, 2013; Karnieli-Miller et al., 2009). Humanness brings life, appreciation and expressiveness to qualitative research, and is an essential element in the sensorial experience of concept mapping.

Due to the visual nature of the data collected in concept mapping, the interpretation of the audience beyond that of the researcher and the participant must also be considered. The seeing of an image always takes place in a social context that influences its impact (Drew & Guillemin, 2014; Pink, 2012; Rose, 2012). It is important to recognize that not all audiences will be able to respond to the way of seeing that is invited by the participant (Pink, 2012, 2013; Rose, 2012). It is the multimodal nature of qualitative concept maps that can help emplace the image and bring a sense of humanness to the process that can be helpful in illuminating the voice of the participant (Clark, 2011; Pink, 2011b; Rose, 2012).

Four criteria defined by Bogdan and Taylor (1989, p. 138) can be useful in embedding humanness in concept mapping, and they include attributing thinking to the other, seeing uniqueness in the other, viewing the other as reciprocating, and defining a social place for the other. These perspectives enable the audience to connect and find sameness in the experiences of the participant and themselves (Bogdan & Taylor, 1989; Russell & Diaz, 2013). Humanness is therefore strongly tied to the notions of aesthetic distance and empathetic understanding. It acknowledges and celebrates the human connection behind qualitative research and bridges the distance between the understanding of audience and the participant message (Cerbone, 2010; Gadamer, 1988; Russell & Diaz, 2013).

## Future Directions

Through this article, the authors have provided a brief history of concept mapping and articulated its ties to traditional quantitative analysis. Qualitative concept mapping was then highlighted as a multimodal and creative form of visual data. It can provide a rich understanding of a participant's learning experience and the subjective meanings related to a phenomenon. Qualitative concept mapping can be utilized in allied health research as a part of the intervention process and as a way to elicit personal and socio-cultural understandings of the participant's engagement in an intervention. It can be used as a medium to share professional decision-making processes that can

enhance inter-professional education (Aberdeen et al., 2010; Miller-Kuhaneck et al., 2007; Passmore, 2013) and offer health professionals the opportunity to illuminate the complexities in the physical, social, cultural and environmental elements of health embedded within the human experience. This article has offered a new framework to expand the use of concept mapping in qualitative research from an arts-based approach. Adapted from the work of Bresler (2006), Rose (2012) and Pink (2009), the authors have outlined three criteria to consider when constructing, analyzing and interpreting qualitative concept maps. These criteria include the following:

1. Voice: Tri-directional Voice and Mutual Absorption;
2. Detail in the Parts & Recognition of the Whole: Uniqueness, Aesthetic Distance, and Emplacement; and
3. Sensory Experience: Intellectual and Emotional Investment, and Humanness.

Each of these criteria is interdependent and informs each other through a dialectical relationship. The complexity and interconnectedness of this framework mirrors the intricacy of qualitative concept mapping.

Future research needs to explore how this proposed framework would be applied in qualitative research studies. The arts-based approach of the framework has the potential to add valuable insights into how people understand the world around them from the integration of multiple sensory experiences. It can provide insight into how different people understand the context in which they live and how their sensory experience of place impacts their health and well-being (Case-Smith et al., 2010; Pink, 2009). Future research could explore how people learn and integrate new information through the use of multiple senses and how this framework can offer an opportunity for those nuances to be highlighted. Further discussion needs to be generated around what it would look like to engage with these categories during the mapping process and throughout data analysis from both the researcher and participant perspectives. Extending the description of categories would facilitate the application of this method in research studies and in the development of professional and inter-professional learning. This article is the beginning of the discussion around acknowledging concept mapping as a multimodal art form that fosters new connections and understandings between the participants, the researchers and the audience.

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