6

Brief Descriptions of Emergent Research Methods

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Emergent research methods are explained in this chapter. These methods extend from Applied Multivariate Research to Synergic Inquiry.

Applied Multivariate Research

The Applied Multivariate Research Method is used in studies in which there are more variables than are contained in a univariate or bivariate designs and where some subsets of the variables must be analyzed together: that is, they must be combined to form composite variables or variates. The method is often used in studies where many experimental treatments are likely to affect the study in more than one way (Grimm and Yarnold 2000).

Forming a linear composite where each variable is weighted in a manner determined by the analysis symbolized by the letter X with subscripts used to differentiate one variable from another is one of the most common ways to combine variables. A weight, referred to as coefficient, is assigned to each variable by multiplying the variable by this value. The weighted composites for three variables, for example, will take the following form:

Weighted composite: $w_1X_1 + w_2X_2 + w_3X_3$

These weighted variables are labelled variables, composite variables, and synthetic variables (Grimm and Yarnold 2000). In this case, variables are not measured by the research in the process of data collection but are developed or computed as part of or as the result of the multivariate data analysis.

This design gives a more detailed description of the phenomenon under investigation and the cost of obtaining data is also relatively small (Harris 2001; Stevens 2009). A study that aims to study how willingly rape victims respond to questions during investigation (will), how many questions they agree or refuse to answer (number), and how confident they are when answering the questions (confidence) will adopt the Applied Multivariate Research Method as this gives a better understanding of the traumatic experiences of the individuals. All three measures will likely correlate with one another to a certain degree and will explain different but related aspects of the participants, thereby giving a full picture of their psyche than any of the issues in isolation.

Appreciative Inquiry

The traditional approach to change is problem-solving in nature. This approach starts off from a negative perspective as something is already broken or damaged, a remedial approach which is often more tasking and costlier. Indeed, this is what many organizations do: i.e. problem identification and solving. However well intended problem-solving approaches to change are, they are often notoriously difficult and sometimes unsuccessful. Resistance to change is a well-established fact of organizational life. Invariably, it involves more work. The shortcomings of this approach to change led to the Appreciative Inquiry Method: a completely different approach to change (Watkins and Bernard 2001).

Appreciative Inquiry is a theory and practice method that approaches change from a positivist framework based on the belief that human systems are made and imagined by those who live and work within them (Watkins and Bernard 2001). It is a change management approach that focuses on identifying a system that is right, analyzing why it is working well, and then doing more of it. It is about the co-evolutionary search for the best in people, their organization, and the relevant worlds around them. Broadly, it involves systematic discovery of what gives life to a living system when it is most alive, most effective, and most constructively capable in economic, ecological and human terms. In other words, the main idea of Appreciative Inquiry is that an organization will grow in whichever direction the people in that organization choose to focus their attention. Hence, there is a connection between a system that works right and its stakeholders. Appreciative

Inquiry involves the act and practice of asking questions that strengthen a system's capacity to apprehend, anticipate, and heighten positive potentials. It assumes that every living system has many untapped, rich and inspiring amounts of positives and use this energy to harness the growth of the organization (Watkins and Bernard, 2001).

The AI process involves the following four stages referred to as the 4-D Cycle: (1) Discovery–the best of what is or what has been; (2) Dream–what might be; (3) Design–what should be; and (4) Destiny–what will be. The United Nations Global Compact, Wal-Mart's global sustainability initiatives, and the United States Navy's establishment of a Center for Positive Change are all products of appreciative inquiries.

Art Practice Research

A dominant feature of the Art Practice Research Method is that it symbolizes philosophies that are given form in the process of making artworks. Regardless of the informing sources, media preferences, or image-base, the artist exercises individual control over the development and presentation of artefacts as forms of knowledge (Sullivan 2005). Additionally, the images and ideas developed have the capacity to not only change the artist's conceptions of reality, but also influence the viewer's interpretation of artworks (Douglas, Scopa and Gray 2000). The Art Practice Research Method, therefore, can be seen as a form of intellectual and imaginative inquiry and as a way that is robust enough to yield reliable insights that are well grounded and culturally relevant to be conducted (Saikaly 2004).

The term 'practice-centered research' has also been used within a framework describing the research process, often with an accompanying argument to describe its inherent integration within creative practice (Saikaly 2004). Saikaly describes practice-centered research through design 'as a form of research' (2004:7) while Wallace and Press locate it within the context of methodology (2003:3). According to the latter authors, the key objective of the research is to define methods that are rooted in craft knowledge and practice that can be applied to the design of digital communication devices as a means of developing product concepts that are more desirable, relevant, and significant to users.

Painter (1996) and Piccini (2002) recognize the wider institutional contexts for practice-based research 'as arenas in which knowledge might be opened', whereby practice becomes a form of research and a way of making research publicly available. Margolin (2000) seeks to encourage practice-led research in product innovation to draw upon other fields of inquiry to understand its social-cultural

dimensions. The parameters used to determine the use of the Art Practice Research Method by Spradley (1979) are as follows: (a) Context–research process based on or rooted in practice, or where practice plays a lead role in the investigative process, and interventions/experiment are 'framed' to investigate how practice can be enhanced or improved; and (b) Purpose–research outcomes make a direct contribution to, or are of direct relevance for, the advancement of practice, and practice informs theory-building within research to gain new insights, knowledge, or understanding.

Cognitive Interviewing

The RAND ('Research ANd Development') Corporation's 1975 study of criminal investigations reveals that the testimony of an eyewitness is an important determinant of whether a case is solved or not. However, it has been found that many eyewitness reports are unreliable as they could be incomplete, partially constructed and vulnerable to suggestions during the interviewing process. Studies have shown that interviewing techniques such as asking leading questions and closed-ended questions can influence the responses given by the interviewee. Here, therefore, lies the importance of the Cognitive Interviewing Method. It is a method of interviewing eyewitnesses and victims about what they remember from a crime scene. It is rooted in two cognitive theories: (1) the encoding specificity principle and (2) the multi-component view of memory based on the following five general memory retrieval rules (McLeod 2010):

1. Mental Reinstatement of Environmental and Personal Contexts: the participant is asked to mentally revisit the to-be-remembered (henceforth, TBR) event.
2. In-depth Reporting: the interviewer encourages the reporting of every detail, regardless of how peripheral it may seem to the main incident.
3. Describing the TBR Event in Several Orders: the participant creates a narrative of the TBR event.
4. Reporting the TBR Event from Different Perspectives: the participant is asked to report the event from several different perspectives.
5. Supplementary Techniques: these techniques are used to elicit specific items from the narrative that the participant provides about what they witnessed.

The Cognitive Interview Method aids to minimize misinterpretation and the uncertainty that is otherwise seen in the questioning process of traditional police interviews. It reliably enhances the process of memory retrieval and has been found

to elicit memories without generating inaccurate accounts or confabulations. Cognitive interviews are increasingly used in police investigations and training programs. McLeod (2010) reports a murder case in which a Miami woman walking through the lobby of an office building had noticed two men standing together. Several minutes after her departure, the men murdered someone working in the building. The woman was taken through the regular police questioning procedure and her narrative was disappointingly scanty. As McLeod points out, it took the intervention of a psychologist, Ronald Fisher, who applied his memory enhancing strategies to get a breakthrough. The strategies include "developing rapport with the witness; asking open-ended questions primarily; asking neutral questions and avoiding leading or suggestive questions; and funneling the interview, beginning with broader questions and narrowing down to more specific questions" (McLeod 2010:1)

Concept Mapping

The Concept Mapping Method is a type of structured conceptualization which can be used by groups to develop a conceptual framework that can guide evaluation or planning. In the typical case, six steps are involved: (1) the preparation, including selection of participants and development of focus for the conceptualization; (2) the generation of statements; (3) the structuring of statements; (4) the representation of statements in the form of a concept map using multidimensional scaling and cluster analysis; (5) the interpretation of maps; and (6) the utilization of maps (Chang, Sung and Chen 2002).

The method is quite robust. It is applicable in situations that allow a group to stay on task; results relatively quickly in an interpretable conceptual framework; expresses this framework entirely in the language of the participants; yields a graphic or pictorial product which simultaneously shows all major ideas and their interrelationships; and often improves group or organizational cohesiveness and morale (Chang, Sung and Chen 2002).

Chang, Sung and Chen (2002) examined the learning effects of a concept-mapping strategy. They designed three concept-mapping approaches–(1) map correction, (2) scaffold fading, and (3) map generation–to determine their effects on students' text comprehension and summarization abilities. The experimental results from 126 fifth graders showed that the map-correction method enhanced text comprehension and summarization abilities and that the scaffold-fading method facilitated summarization ability.

Constructing Grounded Theory

The Constructing Grounded Theory Method was propounded by two sociologists, Barney Glaser and Anselm Strauss (1965, 1967), because of the dominance of existing theories in sociological research. They hinged their argument on the fact that researchers needed a method that permitted them to move from data to theory in order to enable the emergence of new theories (Glaser 1967; Glaser and Strauss 1967; Strauss and Corbin 1990). According to Glaser and Strauss (1967), Grounded Theory is a general methodology for developing theory that is grounded in data systematically gathered and analyzed. They advocated developing theories from research grounded in data rather than deducing testable hypotheses from existing theories. In other words, theory emerges during the process of conducting the actual research through the continuous interaction between analysis and data collection.

Nonetheless, after the publication of *The Discovery of Grounded Theory* by Glaser and Strauss in 1967, Grounded Theory has undergone several revisions. Hence, Charmaz (1990, 2000, 2006) introduced a social constructionist version of Grounded Theory which argues that categories and theories do not emerge from data but are constructed by a researcher through an interaction with the data. Here, the researcher's decisions, the questions that s/he asks of the data, the ways(s) s/he uses the method, as well as his/her background shape the research process and, ultimately, the findings. Consequently, the adoption of a constructivist Grounded Theory approach calls for the researcher to move the Grounded Theory Method further into the realm of interpretive social science consistent with the emphasis of Blumerian (1969) on meaning, without assuming the existence of a one-dimensional external reality (Charmaz 2000).

Charmaz (2000) mapped out the strategy of writing in constructivist Grounded Theory in her work where she advocated a writing style that is more literary than scientific in intent. She argued that constructivist grounded theorists are impelled to be analytical in their writing but that their style of writing needs to be evocative of the experiences of the participants (Charmaz 2000). The researcher's voice should not 'transcend experience but re-envisage it…bringing fragments of fieldwork time, context and mood together in a colloquy of the author's several selves–reflecting, witnessing, wondering, accepting–all at once' (Charmaz and Mitchell 1996:285). It is a delicate balancing act, enabling participants' accounts to retain a degree of visibility in the text so that the reader can make the connections between analytical findings and the data from which they were derived (Fossey et al. 2002; Jones 2002).

Mill et al. (2006) listed several articles where constructivist Grounded Theory has been applied during their review of the literature. These came from the

disciplines of education (Jones 2002; Jones and Hill 2003), psychology (Corbet-Owen and Kruger 2001; Dodson and Dickert 2004; Madill, Jordan and Shirley 2000; Stratton 1997), occupational and environmental medicine (Gustafsson et al. 2003), and nursing (Annells 1997; McCann and Clark 2003a; Norton 1999). Each of these authors drew on the work of Charmaz (1995b, 2000) in formulating their arguments for assuming a constructivist approach in their own studies.

Experience Sampling

The Experience Sampling Method is a structured diary technique used to appraise subjective experiences of daily life (Verhagen et al. 2016). According to Larson and Csikszentmihalyi (1993), the method is a procedure for studying what people do, feel, and think during their daily lives. The method involves asking individuals to provide systematic self-reports at random, on a daily basis. Sets of the reports from a sample of individuals yield an archival file of daily experiences (Larson and Csikszentmihalyi 1993). The common questions that can be answered using the file reports include the following: How do people spend their time? What do they usually feel when engaged in various activities? One of the earliest proponents of the method was Kurt Lewin (1935, 1936). He advocated for the investigation of 'topology' of daily activity. He further believed that by examining the psychological life space, it would be possible to understand the forces that structure daily thought and behavior.

The method is applied in the study of psychological patients as well as during an investigation if patients with somatic illness (Verhagen et al. 2016). It is ecologically valid as it yields a comprehensive view of an individual's daily life. The method allows a researcher to assess various constructs like quality of life and psychological mechanism, for instance, stress sensitivity or coping strategies. Such constructs are normally difficult to assess using some cross-sectional questionnaires. Some medical researchers apply the method in treatment monitoring, clinical trials, or single case clinical trials.

Technological advances like the use of smartphones have made the use of the Experience Sampling Method easier. This method has been widely utilized by medical researchers for academic and professional purposes.

Feminist Research Practice

The Feminist Research Practice Method comprises a set of analytical tools that demonstrate how to specifically promote social change for women and other oppressed groups (Sharlene 2013). Feminist research positions gender as the

categorical center of inquiry and the research process. It also uses a variety of research methodologies such as quantitative, qualitative, and mixed or multiple methodologies. Nonetheless, both quantitative and qualitative methodologies have produced a collection of mixed results. This mixed method is utilized to resolve the limitations of a single method by the innovative use of triangulation. There are various feminist research methods that exist today which are used for data gathering and analysis. According to Sharlene (2013), a research is considered 'feminist' when it is grounded in the set of theoretical traditions that privilege the issues, voices, and lived experiences of women. From data collection, analysis and interpretation, and the process by which feminist researchers conduct their research projects, feminist research praxis centralizes the relationship between the researchers and researched to balance differing levels of power and authority. One of the main goals of feminist research projects is to support social justice and social transformation. The research practice seeks to study and to redress the many inequalities and social injustices that continue to undermine and even destroy the lives of women and their families.

When using the Feminist Research Practice Method, a researcher looks at the patterns and trends within the population of women and then draws conclusions based on the varied range of women's unique circumstances. The method seeks to reveal and overcome andocentric (denoting or being a construction in which the whole has the same syntactic function as the head, for example *big black dogs*) biases in research, seeks to encourage social change, and seeks to represent human diversity and acknowledge the positionality of the researcher. Feminist researchers such as Deborah King, Patricia Hill Colins, Chandra Mohanty, bell hooks, and Gloria Anzaldua address the interconnections among categories of difference such as gender, ethnicity, nationality, and class. Feminist researchers can undertake research using two fundamental approaches: firstly, by using the traditional research process referred to as 'quantitative' methodology or by using the 'qualitative' ethnographic method which employs techniques that ground analysis in real life and allows researchers to examine how social experience is established and given meaning. Qualitative research focuses on obtaining a truthful description of how a problem or solution is experienced by those who lived it. The quantitative methods include in-depth research into the motivation, attitudes, and behaviors of respondents, or into a given situation. This is applied when gathering statistical information which allows the researcher to recognize the enormity of a widely occurring problem such as the abuse of women (Hankivsky 1999). This method helps the women by comforting them with the fact that they are not isolated in their experience; thus, a qualitative approach to feminist research may be a powerful tool for setting women's experiences in a larger context.

Since feminists encounter specific methodological problems, they have been involved in developing newer approaches for doing feminist research. Of these many feminists, Maria Mies is the one that introduced a new methodological approach 'consistent with the political aims of the women's movement.' By understanding the many relevant feminist research methods for women's liberation, feminist researchers have also established different ways of dealing with the inequalities concerned with research. The different ways feminists deal with variation is to study their own personal experiences, preferences, and environments, along with other researchers giving them a helping hand and support when necessary (Hankivsky 1999).

An example of how this method has been applied includes Barata et al.'s (2005) study from which feminist methodology research paper was produced titled 'Ivory Tower? Feminist Woman's Experiences of Graduate School'. This article is well written as an example of feminist research theory. The researchers are themselves active participants in a documented discussion process through which they evoked a feminist ideology. The ideology is supported by putting women at the center of the study, aspiring to have the research ultimately benefit women and providing an accurate reflection of each woman's experiences.

Fuzzy Set Theory

The Fuzzy Set Theory Method is described by Zadeh as '…a convenient point of departure for the construction of a conceptual framework which parallels in many respects the framework used in the case of ordinary sets, but is more general than the latter and, potentially, may prove to have a much wider scope of applicability, particularly in the fields of pattern classification and information processing' (Zadeh 1965:338). Fuzzy Set Theory was initially intended to be an extension of dual logic and/or classical set theory. It is an approach of graded concepts in which everything is a matter of degree or, to put it figuratively, everything has elasticity (Maiers and Sherif 1985; Zimmermann 2011).

Fuzzy Set Theory has been applied in artificial intelligence, computer science, medicine, control engineering, decision theory, expert systems, logic, management science, operations research, pattern recognition, and robotics (Zimmermann 2011). It is also being widely used in African Mathematics and other African-centered disciplines (see, for example, Bangura 2011a and 2011b).

Geographic Information Systems

As defined by Verd and Porcel (2012), Geographic Information Systems (henceforth, GIS) is a set of methods, software, and technologies that have been

adapted for storing, analyzing and mapping of geographic information. As stated earlier, over the years, GIS has been used mainly for quantitative analysis with disregard for qualitative data. However, due to advancements in its application, GIS has recently been applied in qualitative research. From the 1980s till present, there has been a remarkable shift in the application of the method. It is no longer centered on specific research areas in Geography; rather, it has transcended geographic discourse into the study of socio-spatial issues (Sheppard 2005).

GIS is being used for a wide range of research questions which may be exploratory (learn about a new issue), descriptive (describe a phenomenon), explanatory (explain a phenomenon), or predictive (predict future patterns). In fact, it is a tool for all kinds of research questions and research approaches. In quantitative research, numerical analytical techniques are applied to address geographic research questions of all types. For qualitative research, non-numerical information such as conversations, visual images, and much more are analyzed (Sheppard 2005).

GIS has been applied in land-use planning approaches to determine local populations' perceptions about land utilization. An example of how this method has been applied is the investigation of two villages in Mekong Delta, Vietnam (Trung et al. 2006). In the study, GIS was used to integrate spatial data and attribute data acquired from farmer discussions and cross-section walks, and to analyze the changes in not only many biophysical and land cover changes, but also farmers' perceptions of changes in land utilization. The major result of the investigation was the production of sets of land use option maps with their resources requirements which will be helpful for decision-makers to adopt the most suitable land use plan.

Hypermedia Research

The concept of hypermedia means an interactive subset of more general multimedia. Thus, the Hypermedia Research Method (henceforth, HRM) allows the user to leave the main body of ideas and browse through associated media in a nonlinear manner using hypertext (Bewley 1999). Hypertext refers to links in the program that are obtained by clicking on words, buttons, or icons that transfers one's computer screen into another information center or site (Franklin and Kinnell 1990:5).

Kosma (1991) says that hypermedia facilitates cognitive flexibility because it allows a topic to be explored in multiple ways, using a variety of concepts and themes. This results in the development of integrated and flexible knowledge structures that facilitate the use of this knowledge to solve a wide range of problems.

HRM is one of the first methodologies that have been developed to define the structure and interaction in hypermedia applications (Garzotto, Paolini and Schwabe 1993). According to Garzotto, Paolini and Schwabe (1993), HRM is based on the Entity-Related (E-R) Methodology but extends the concept of entity and introduces new primitives as *units* (corresponding to 'nodes') and *links*. HRM entities are embedded within an inner structure and have associated a browsing semantics to them: i.e. a specification of how navigation may be performed and how information is visualised. Koch (1999) defines entity to be a hierarchy of components which are made of units. Also, three types of links are defined: (1) structural links are links that connect components; (2) perspective links link units and these links can be automatically derived from the structure of the entities; and (3) application links are defined as connecting components and entities of the same or different type (Koch 1999).

In addition, there are two different groups of entities in HRM: (1) the application entities and (2) the '*outlines*' that allow the access to the application entities offering entry points to start navigation and possibility to locate and select entities. These outlines or access structures are ordered trees of components. The application entities constitute the hyper base (Koch 1999).

According to Garzotto, Mainetti and Paollini (1995), there are 5 dimensions in the analysis of applying HRM. These are: (1) Content: this addresses the pieces of information; (2) Structure: this is the content's organisation; (3) Presentation: this defines how the application content functions are shown to the users; (4) Dynamics: this is the functionality operated on presentational elements through the interaction for HRM; and (5) Interaction: in other methods, interaction is considered as part of the dynamics and presentation as it is a combinations of both factors (Garzotto, Mainetti and Paollini 1995).

Other outlines defined by the HRM application, according to Koch, are the following: (a) Index links: these connect the collection node to each member of the collection; (b) Guided tours: a guided tour link connects the collection's nodes in a linear sequence with each member connected to the next and previous one; and (c) Collection links: these are index or guided tour links that allow for traversing the nodes of a collection. Koch explained that in order to support a presentational design, the HRM application defines two concepts: (1) Slot: an atomic piece of information which can be simple or complex, such as a video synchronised with sound; Slots are comprised of frames; and (2) Frame: a presentation unit–i.e. what is shown to the user (Koch 1999).

In sum, the HRM distinguishes between authoring-in-the-large and authoring-in-the-small. The first one identifies the entities, components, and units, while

the second one fills these units with content. The method specifies the structure of the hyper base, as authoring-in-the-small is not within its scope (Koch 1999).

Inside Interviewing

Traditional interview techniques, assert Holstein and Gubrium (2003) and Bangura (2011a), typically stress the need for establishing rapport with respondents and asking questions that do not influence the responses. The Inside Interviewing Method allows a researcher to capture the fluctuating and diverse moral worlds put into place during interview research when gender, race, culture, age, and other subject positions are brought narratively to the foreground. It also allows one to explore the communicative contexts of respondents' thoughts, feelings, and actions, and how meaning is not merely elicited by appropriate questioning nor transported through clear respondent replies, but *actively* and *socially* assembled in the interview encounter, along with changing understandings of what it means to be a particular subject (Holstein and Gubrium, 2003; Bangura 2011a).

The Inside Interviewing Method makes it possible for the researcher to explore the following issues (Holstein and Gubrium 2003; Bangura 2011a):

a. the varied roles that interview participants play, alerting one to the theoretical dimensions of subjectivity, and how this awareness can affect the interview process;
b. the interpretive challenges researchers face in analyzing data collected from interview respondents and their representational positions concerning the subject matter in question; and
c. methods for describing lives that incorporate the representational sensibilities of both interviewees and interview researchers.

The Inside Interviewing Method therefore helps a researcher to highlight the fluctuating and diverse moral worlds put into place during interview research when gender, race, culture, age of respondents and other subject positions are brought 'narratively' to the foreground (Holstein and Gubrium 2003). The method facilitates the exploration of facts, thoughts, feelings and perspectives of respondents, and how these impact the research process or procedure. It also provides a researcher with insights to selecting the appropriate analytic strategy for explicating data that emerges from related activities in the interview process. Until recently, no scholar's work has seriously explored who the subjects are behind interview participants (Holstein and Gubrium 2003).

Other scholars have also shown that the method helps a researcher to explore the communicative contexts of respondents' thoughts, feelings, and actions, and how meaning is not merely elicited by appropriate questioning nor transported through clear respondent replies, but actively and socially assembled in the interview encounter, along with changing understandings of what it means to be a particular subject (e.g., Plakhotnik at al. 2005; Rocco 2004; Briggs 2003).

In sum, the Inside Interviewing Method helps a researcher to explore the representational complexities that emerge when research participation is scrutinized, as well as the technical concerns and analytic options that derive from new lenses for viewing the interview process. These new lenses provide users with theoretically informed direction for figuring how interview participants relate to each other, how to elicit interview data, and how to select alternative ways of representing interview material (Holstein and Gubrium 2003; Bangura 2011a).

Interactive Qualitative Analysis

Qualitative Methodology is an 'inquiry process aimed at understanding social or human problems based in a natural setting. With qualitative research, there are multiple perspectives of reality, which are subjective and open to researcher bias as the researcher actively participates in the research process and analyzes the data and in so doing builds an understanding of a complex set of processes while reporting on the views of participants' (Creswell 1994). Similarly, Dennen (2005) states that the Interactive Qualitative Analysis (henceforth, IQA) Method is an innovative method providing a structured approach to conducting qualitative research. Participants or constituents are actively engaged in data collection and analysis. This innovative method seeks to minimize the power relations and biases traditionally associated with qualitative research.

With the IQA Method, participants are actively engaged in collecting and analyzing data. Using thematic content analysis of the data, they articulate their experiences of the phenomenon and identify emergent themes, or affinities, and the relationships among the affinities (Northcutt and McCoy 2004). The outcome of the IQA process is a Systems Influence Diagram (SID) which is 'a visual representation of the phenomenon, constructed through the lens of the constituents' (Northcutt and McCoy 2004). What sets IQA apart from other forms of qualitative inquiry is that it provides an audit trail of transparent and traceable procedures where the constituents, and not the researcher as expert, do the analysis and interpretation of their data (Tabane and Human-Vogel 2010).

Measurement Error and Research Design

The Measurement Error and Research Design Method is an elusive phenomenon. First, it will be instructive to look at the word 'error' to get a better understanding of the topic. 'Error' relates to a mistake, and people are blamed for mistakes. In scientific usage, however, it relates to an unexplained disparity in a measurement, and the term is not derogatory.

The Measurement Error and Research Design Method is a process that when employed to investigate an entity has the following three aspects: (1) a characteristic, (2) a scale, and (3) a means of assigning a number on the scale to that characteristic (Stevens 1946). Hand (1996) distinguishes three main error measurement paradigms: (1) representational, (2) operational (Dingle 1950), and (3) classical. In the representational paradigm, objects have attributes, and numbers are assigned to the attributes to describe the relationships among them. The operational paradigm defines scientific concepts in terms of the operations used to describe them and avoids assuming any underlying reality. The classical paradigm assumes pre-existing relationships and seeks to discover them (Hand 1996). Campbell (1920) describes a 'fundamental' measurement as satisfying an order relationship and a process of concatenation. Bednjamin D. Wright and Mark H. Stone mention George Rasch's (1960) 1-parameter logistic model to imply a theory which enables fundamental measurements in the behavioral sciences (Wright and Stone 1979). The Measurement Error and Research Design Method therefore refers to an actual or notional equivalent replication of the assessment process which potentially gives a different value. In other words, it would include sampling error in trying to estimate a population quantity from a sample. It is nearer to the framework of generalizability theory (see, for example, Brennan 1983) than to the classical definition.

The method is well illustrated in a study by Mastekaasa and Kaasa (1989) on the quality of life of terminally ill lung cancer patients. The main purpose of the study was to examine whether two types of treatments (radiation therapy and chemotherapy) had differential effects on the patients' subjective well-being and other aspects of their overall quality of life. The patients responded to a questionnaire that included measures of subjective well-being and several other variables before the start of treatment and at seven different time points in the year following the start of the treatment. A total of 101 patients responded to the pre-treatment questionnaire (response rate = 99 percent), but mainly due to the very high mortality of this group of patients the number of respondents was down to 31 at the last wave of observations (response rate = 73 percent). Pooling across the seven post-treatment waves provides a total sample of 460 observations.

Family Research

Research is conducted on families in order to describe and explain the inherent complexity of families emphasizing both process and context. Addressing such complexity requires research that is 'multidisciplinary, broad in scope, and linked to the contexts in which people live' (O'Brien 2005). The qualitative and ethnographic research methods are essential for understanding family life. Family histories, cultural contexts, everyday routines and practices, narratives, experiences, intentions, stories, triumphs, secrets, troubles, and pain all matter deeply, and are what families mean to us. This information surely deserves to be understood and used in our research. Without incorporating qualitative methods in family research, those aspects of family life can never be fully captured. Thus, any concern over the use of qualitative methods certainly should not be whether such evidence can be valuable; it already is. The question rather is how best to collect such information in ways that are productive, meaningful, believable, and add value to research. When using the Methods of Family Research, the value of integrating qualitative evidence with quantitative data is emphasized (O'Brien 2005).

Most theoretical frameworks in family research are open to qualitative evidence because our widely accepted conceptual and heuristic framework, which combines biological substrate, ecological setting, beliefs and behaviours, and the experiences and meaning systems of individuals in families, is followed throughout its development. Family systems approaches, including Bronfenbrenner's model that blends 'person, process, context and time' (Bronfenbrenner 1995, 2005), provide conceptual frameworks that invite qualitative methods. Qualitative and ethnographic methods provide information on settings and contexts, and on the experiences, meaning systems and normative scripts that drive family life and direct our behaviors (D'Andrade and Strauss 1992).

Although qualitative methods might well be preferred over quantitative methods for understanding meanings, experiences, interpretations, intentions, cultural models and scripts, and narratives and stories family members have about their world, quantitative methods are equally valuable for investigating these aspects. As Yoshikawa and his colleagues state,

> ... quantitative research [provides methods] of inquiry that analyze numeric representations of the world. Survey and questionnaire data as well as biological or physiological data are often analyzed in quantitative units. Inquiry that relies on qualitative methods collects and analyzes non-numeric representations of the world–words, texts, narratives, pictures, and/or observations. The epistemological

> assumption . . . is that in scientific endeavors, the world can be represented through both numbers and words and that numbers and words should be given equal status in [family research] (Yoshikawa et al. 2008:344).

Based on this postulation, it is therefore important to guard against identification with or commitment to certain methods turned into a personal identity or ideology as opposed to considering methods as tools for representing the family topics we are trying to understand (Weisner 1996). Such 'methodocentrism' can lead to confusing the topics about family life that we want to study (e.g., attachment, sibling relationships, family budgeting, work-family balance, etc.) with particular methods for studying them (e.g., the Strange Situation, questionnaires, daily routine diaries, stress scales, etc.). Methods of Family Research are therefore excellent tools for the fields of Family Studies, Human Ecology, Home Economics, Sociology, Gerontology and related disciplines.

The Family Outcome Survey (henceforth, FOS) developed by Bailey, Hebbeler and Bruder (2006) is a good example of how quantitative methods are applied to family research from the Early Childhood Outcomes (ECO) Center to measure five recommended family outcome areas: (1) families understand their children's strengths, abilities, and special needs; (2) families know their rights and advocate effectively for their children; (3) families help their children develop and learn; (4) families have support systems; and (5) families access desired services, programs, and activities in their communities.

The five family outcomes were identified through a consensus building process that began with a review of existing frameworks for conceptualizing family outcomes. The FOS consists of 15 outcome items, three for each of the five outcome areas. The instrument is a self-report survey intended to be completed by one or more family members. Each item is based on a seven-point scale with descriptors for 1, 3, 5, and 7. Families are asked to read each question and circle the number that 'best describes your family right now.' The three items that provide data for Part C, early intervention, ask families to rate their perceptions of the helpfulness of early intervention with regard to knowing and understanding their rights, effectively communicating their child's needs, and helping their child develop and learn. The three items that provide the data for Part B, preschool, address three dimensions of parent involvement. Slight modifications in the survey have been made to create versions that can be used with all families, including those whose children do not have disabilities (Bailey, Hebbeler and Bruder 2006).

Once the instrument for collecting data were returned, there was a need to examine the percentage returned and whether those surveys adequately represented

all the families in the research population. Prior to analyzing the FOS data, there was a need to examine the data to see which segments of the population returned the survey. If all key segments are well represented, then it can be confidently said that the data generalize to the entire population. Percentages, frequencies, figures, were used to describe and present the data while appropriate statistical tools were also employed to analyze data. The findings from the analyzed data were then discussed to derive meanings (Bailey, Hebbeler and Bruder 2006).

Multilevel Modeling

This method utilizes observational data collected especially in the human and biological sciences which have a clustered structure. Multilevel data structures can also arise in longitudinal studies especially where an individual's responses over time are correlated with one another. The method is employed to identify the existence of such data clusters or hierarchies by allowing for lingering components at each level in the hierarchy. The Multilevel Modeling Method is also regarded as a generalization of regression methods, and this can be used for a variety purposes, including data reduction and causal inference from experiments and observational studies (Gelman 2006).

The method was applied by Rice and Leyland in their study on 'Multilevel Models: Application to Health Data' (1996). Their goal was to highlight the potential benefits that might be gained by using this method in investigating phenomena in the field of health.

Multiple Imputations for Nonresponse in Surveys

Irrespective of the type of survey a researcher utilizes, cases of missing response often arise. Some respondents do respond to some survey items while they ignore others. Nonresponse constitutes a limitation because standard methods of analysis cannot be used to analyze an instrument with missing responses. The traditional way of managing that situation is by excluding such questionnaire with missing responses from the analysis. The implication of this approach is that it reduces the size of the data. Furthermore, it biases the data since such respondents might have a reason for not responding to certain items of the survey. It also equates nonresponse to certain items of the survey to refusal to respond at all. Current thinking, however, regards nonresponse as a form of response in its own place and maintains that it deserves to be accounted for in analysis. One major way through which this situation is addressed is by using the Multiple Imputations for Nonresponse in Surveys Method. Multiple imputations comprise 'the technique

that replaces each missing or deficient value with two or more acceptable values representing a distribution of possibilities' (Rubin 2004:2).

In using the Multiple Imputations for Nonresponse in Surveys Method, the analyst studies the relationships among the omitted items, the relationships among the items to which the respondents responded, and the relationships between the set of omitted and the set of completed items. Doing this establishes a pattern of understanding and can produce a systematic explanation for the nonresponse decisions of the respondents. During analysis, the researcher is sensitive to the background information of the respondents in assigning values to the missing items in the surveys. Computer applications are available to assist researchers in addressing the problem of nonresponse in surveys. Despite this, in a study of 364 survey articles, Lindner, Murphy and Briers (2001) found that only 214 articles report nonresponses. Out of the 214 articles, less than a half (46.7%) addressed the nonresponse issue. This showed that few researchers took advantage of the available methods to address the issue of survey nonresponses systematically.

Multiple Time Series

The Multiple Time Series Method extends many of the ideas of univariate time-series analysis to systems of equations. Analyzing a single time-series in isolation is reasonable, albeit it may be limiting. According to Bangura (2011a), many analyses of time series data involve multiple, related variables. The *Multiple Time Series Method helps a researcher to* address many specification choices and special challenges. It deals with the main challenges for modeling simultaneous equations, autoregressive integrated moving average (ARIMA), error correction models, and vector autoregression–i.e. a generalization of the other approaches mentioned. Specification, estimation, and inference using these models are also addressed by this method.

Wagner et al. in their study titled 'Intelligent Techniques for Forecasting Multiple Time Series in Real-world Systems' (2011) used the method to study 'a real-world system developed for a large food distribution company which required forecasting demand for thousands of products across multiple warehouses.' After finding out that it is I mperative for the system to 'model and predict on the order of 10^5', the researchers go on to show how the system's forecasting algorithm can be utilized to effectively deal with several challenging tasks such as 'the prediction of multiple time series, the need for a continuously self-updating model, and the desire to automatically identify and analyze various time series characteristics such as seasonal spikes and unprecedented events' (Wagner et al. 2011:284).

Polytomous Item Response Theory Models

Polytomous Item Response Theory Models have become the most widely adopted method for educational scaling development and assessments. The extensive use of the method is a result of the many advantages it offers in solving practical and testing problems which require linking and equating, establishing the psychometric properties of assessments and items, optimizing the efficiency of test delivery through adapted assessment systems, as well as coupling assessment scoring and development procedures with the cognitive qualities which are involved in generating responses to items (Penfield 2014).

Also, Polytomous Item Response Theory Models have been proven useful in reviewing some general Item Response Theory doctrines and terminology in the context of dichotomous items. Thus, considering an assessment consisting of a series of items, whereby each item is scored into a precise number of categories suitable for estimating a respondent's level of the trait considered by the assessment, what results is the target trait (Penfield 2014).

A good example of the utility of the method is the research conducted by Penfield titled 'An NCME [National Council on Measurement in Education] Instruction Module on Polytomous Item Response Theory Models' (2014). The method was used to increase the polytomous items in assessment practices, thereby revealing that specialized Polytomous Item Response Theory Models are becoming more popular and common in research.

Postmodernist Interviewing

The Postmodernist Interviewing Method relies on the tenet of postmodern philosophy which views knowledge as a construction. This form of interviewing deemphasizes the control of the interviewer over the interview process. The interviewee is empowered to construct his/her experiences. The goal of the interview questions is not to extract information from the interviewee but to guide the interviewee to produce a unique knowledge of his/her experiences (Diane Stopyra's Research Blog 2010). Therefore, the method emphasizes minimal input of the interviewer in the interview process. The interviewer serves as the learner in the process and a co-constructor of the interviewee's experiences (Fontana 2002). In engaging the interview data, the interviewer must account for the factors such as social, cultural, historical and economic which may influence the interviewee's reconstruction of the experiences (Fontana and Frey 1994).

The Postmodern idea of interview does not only transform the interview approach but also the number of interviewers. While the modernist interviewer

approach continues to be relevant, the postmodernist approach emphasizes that at certain times several interviewers may be appropriate (Rosenblatt 2012). Kogan (1998) employs discourse analysis to analyze a postmodern interview. He finds the interview approach useful to family therapists who tend to focus on how to talk to or interact with clients as a way of proffering solutions to family problems. It, however, challenges the dominant nature of therapy theory and techniques which subjugate client narratives to that of the therapists by offering the clients' opportunity to construct their experiences without much influence from the therapist.

Reframing Evaluation through Appreciative Inquiry

The Reframing Evaluation through Appreciative Inquiry Method is used to systematically assess individuals, groups, and organizations in ways that inquires, defines, and further develops the best of 'what is' in organizations in order to establish a better future. It is a means of addressing issues, challenges, and concerns of an organization in ways that build on the successful, effective and organizing experiences of its members. As the name suggests, the method is about recognizing the best in people, acknowledging those things that give life, and affirming past and present strengths, successes, assets and potentials. It seeks to achieve the transformation of culture from one that is negative to the one that can enhance positive achievements in an organization (Elliot 1999). The method borrows from the strength of many other practices in the field of organizational development such as open space technology (approach to self-organizing), whole sale change (facilitate large scale meeting), organizational learning (valuing inquiry reflections and dialogue as well as future research) (Elliot 1999).

The method has been applied to strategic planning, cultural transformation, increasing customer satisfaction, organizational design and leadership development, and organizational partnerships. It is also used in peace building and educational reforms (Whitney and Bloom 2003). It has been applied to help organizations through discovering and valuing, envisioning, dialoguing and constructing the future (Ashford and Patkar 2004). It supports generative learning within organizations–the ones that encourage continuous experiences and innovations. In short, therefore, the method is applied to organizational development and change and to practice of evaluation (Ashford and Patkar 2004).

The Reframing Evaluation through Appreciative Inquiry Method is used when one needs to understand the underlying motivations for the performances of individuals and organizations. Affirmative questions that reflect, share past

successful experience, and use strength-based language provide more energy, hope, and excitement about establishing a desired future. In this method of inquiry, research questions can be based on 4-Is: i.e. (1) Inquire (experience and values), (2) Imagine (clarification of values through dialogue and possibilities), (3) Innovate (set new strategies and directions), and (4) Implement (implement innovation, set organizational compass, monitor progress and evaluate results) (Barrett and Fry 2005; Cooperider and Whitney 2007).

Reliability and Risk Models

According to Todinov (2005) and Bangura (2011a), Reliability and Risk Models entail practical, probabilistic methods, statistical and numerical procedures, applications and case studies for settling reliability requirements. They provide a researcher the tools to quantify risk and construct probability in conjunction with real-world decision-making problems, including a host of institutional, organizational, political and cultural considerations.

One of the main requirements of any research process is the reliability of the data and findings (Zohrabi 2013). Reliability deals with the consistency, dependability, and replicability of 'the results obtained from a piece of research' (Nunan 1999:14). Reliability can be classified into two categories. The first category is external reliability, which is concerned with the replication of a study. As Burns asks, 'Can an independent researcher reproduce the study and obtain results similar to the original study?' (1999:21-20). The second category is internal reliability, which deals with the consistency of collecting, analyzing and interpreting the data. Internal reliability might be obtained when an independent researcher on reanalyzing the information comes to similar findings as the original researcher. It concerns whether, as Burns asks, '…the same results be obtained by other researchers using the same analysis?' (1999:21). These reliability categories deal with the uses of low inference descriptors, multiple researchers/participant researchers, peer examination and mechanically recorded data (Burns 1999:21).

Sørensen (2004) defines risk as the expected consequences associated with a given activity. Considering an activity with only one event with potential consequences of risk R is thus the probability that this event will occur P multiplied with the consequences given the event occurs R = P x C. Risk assessment is used in a number of situations with the general intention to indicate that important aspects of uncertainties, probabilities and/or frequencies and consequences have been considered in some way or another (Sørensen 2004).

Also, according to Sørensen (2004), calculated risks are compared with the accepted risks initially stated in the risk acceptance criteria. Should the risks not be acceptable in accordance with the specified risk acceptance criteria, there are principally the following four different ways to proceed, as suggested by Sørensen (2004):

1. Risk Mitigation is implemented by modification of the system such that the source of risk is removed. For example, the risk of fatalities from a ship collision with a bridge may be mitigated by traffic lights stopping traffic proceeding onto the bridge whenever a ship navigates under the bridge.
2. Risk Reduction may be implemented by reduction of the consequences and/or the probability of occurrence–in practice, risk reduction is normally performed by a physical modification of the considered system.
3. Risk Transfer may be performed by, for example, insurance or other financial arrangements where a third party takes over the risk.
4. Risk Acceptance: if the risks do not comply with the risk acceptance criteria and other approaches for risk treatment are not effective, then risk acceptance may be an option.

Acceptance of risk is basically a problem of decision-making, and it is inevitably influenced by many factors such as type of activity; level of loss; economic, political, and social factors; confidence in risk estimation, etc. A risk estimate, in the simplest form, is considered acceptable when it is below the level which divides the unacceptable from acceptable risks. For example, an estimate of individual risk per annum of 10-7 can be considered as 'negligible risk'; similarly, an estimate of injuries occurring several times per year can be considered as 'unacceptable'. The 'as low as reasonably practicable' (ALARP) principle is sometimes used as the only acceptance principle and sometimes in addition to other risk acceptance criteria (Sørensen 2004).

Indeed, Reliability and Risk Models are essential for practicing engineers, researchers, and consultants dealing with reliability and risk assessment. Professors and graduate students involved in reliability engineering will also find it an excellent reference, and it is also a useful tool for actuaries, economics, and applied probability and statistics. Subsequently, Reliability and Risk Models are now commonly used by researchers studying assessment and management, transportation, finance, medicine, and the social sciences (Todinov 2005).

Research Models for Community Change

Everyone is a member of a community, and every community is continually changing. To successfully manage that change, community members need

information. Therefore, an in-depth understanding of the research models that communities can use to solve problems, develop their resources, protect their identities, and build power, is important. With an engaging writing style and numerous real-world examples, Stoecker (2013) shows how to use a project-based research model in the community to diagnose a community's condition, prescribe an intervention for the condition, implement the prescription, and evaluate its impact. At every stage of this model, there are research tasks, from needs and assets assessments to process and outcome assessments. Readers also learn about the importance of involving community members at every stage of a research project and in every aspect of the research.

Research Models for Community Change constitute a project-based approach, an in-depth review of all the research methods that communities use to solve problems, develop their resources, and protect their identities. According to Stoecker, it is imperative to involve community members at every stage of a research project and in every aspect of the research, making the research part of the community-building process. The research is done for community development. It has a goose approach to research (i.e. doing research with people instead of on them), a participatory action approach, a project-based approach model, and a diagnosing model (Stoecker 2013).

The models are well suited for social scientists and community development practitioners such as social workers and public health workers. Community service workers, professional researchers, and consultants also find this method an invaluable guide to effecting change in their communities. Stoecker (2013) demonstrates that the models are valuable and can be used by people anywhere as a tool for organizing and developing their communities. The project-based research models build community and democracy by redistributing both power and responsibility. Thus, according to Stoecker (2013), good quality research can make meaningful differences in people's lives.

Situational Analysis

The Situational Analysis Method, developed by Adele Clarke, is a novel approach to qualitative data analysis with deep roots in the Grounded Theory method, symbolic interactionism, feminism, the post-structural work of Michel Foucault, and Anselm Strauss's Social World's Theory (Clarke 2012). Situational Analysis gives researchers practical mapping tools for designing qualitative research projects and conducting analysis of qualitative empirical material. The method is particularly useful for multi-sited ethnographic projects, research projects

including both human and non-human actors, and multiple forms of empirical material (Clarke 2012).

The method involves making three kinds of maps: (1) situational maps, which lay out the major human, nonhuman, symbolic, discursive, and other elements in a situation, provoking analyses of relations among them- (2) social world/arena maps, which lay out the collective actors and their arena(s) of commitment- and (3) positional maps, which lay out major positions taken and not taken in the discursive data. Situational Analysis goes beyond the conventional qualitative methods assertion that 'context matters' in considering a case. In contrast, Situational Analysis asserts that there is no such thing as 'context'. Instead, the conditions of the situation are said to be in the situation. Hence, the conditional elements of the situation need to be specified in the analysis of the situation itself because they are constitutive of it, not merely surrounding it or framing it, or contributing to it. They *are* it. The situation itself is the key unit of analysis. Cases cannot be abstracted from situations. Cases are situations (Clarke 2012).

This method can be used across many disciplines in a wide array of research projects drawing on interview, ethnographic, historical, visual, and/or other discursive materials, including documents. It allows researchers to draw together studies of discourses and agencies, actions and structures, images, texts and contexts, histories and the present moment to analyze complex cases in depth. It is especially useful in multi-site research (Clarke 2012).

A complete Situation Analysis Method allows a researcher to gather information on four areas: (1) the problem, its severity, and its causes; (2) the people affected by the problem (potential audiences); (3) the broad context in which the problem exists; and (4) factors inhibiting or facilitating behavior change. In essence, the method is useful for a comprehensive review of the situation at hand, providing an understanding of many contextual factors, such as the: types and extent of violence against women and girls, needs within a population, strengths and weaknesses of available services, laws, policies and plans that exist to address an issue, resources available to address an issue, knowledge, attitudes and practices of key actors within different sectors and within the community (Clarke 2012).

Spectral Analysis of Time-Series Data

As Warner (1998) and Bangura (2011a) recount, when we encounter time series, most of us often try to fit trends (linear, quadratic, cubic, etc.). We fail to note that trends imply that the long-range forecast is a very extreme response: i.e. trend models inevitably predict very extreme responses in the future. Today, however,

which is usually not all that extreme, is yesterday's future. Trends very often are insufficient in modeling over-time processes. Cycles often offer a much more reasonable approach to comprehend variation over time than do trends.

Warner (1998) and Bangura (2011a) add that the Spectral Analysis of Time-Series Data Method is useful for describing cyclic patterns in time-series data. It is ideal for researchers who have many different kinds of time-series data such as social indicator data (e.g., number of divorces per annum), systematically coded observational data (e.g., level of effective involvement of each person in a mother-infant dyad), physiological data (e.g., measures of blood pressure), or measures of perceptual sensitivity or threshold. The method therefore provides some relatively simple ways to characterize any cycle tendencies that are present: the proportion of variance in the time series that is accounted for by the cycle, the length of the cycle, and the amplitude of the cycle.

Time-series data have a natural temporal ordering. This makes time-series analysis distinct from cross-sectional studies, in which there is no natural ordering of the observations: for example, explaining people's wages by reference to their respective education levels, where the individuals' data could be entered in any order. Time-series analysis is also distinct from spatial data analysis whereby the observations typically relate to geographical locations (e.g., accounting for house prices by location as well as the intrinsic characteristics of the houses). A stochastic model for a time series will generally reflect the fact that observations close together in time will be more closely related than observations further apart. Time-series models will often make use of the natural one-way ordering of time so that values for a given period will be expressed as deriving in some way from past values, rather than from future values (Imdadullah 2014).

From a spectral analysis perspective, time series is applied when the length of a time series is between at least five and ten times the length of the cycle that interests a researcher. To apply this method, there is consideration of sampling frequency because if there is no adequate sampling of the signal, a high frequency signal might appear like a low frequency signal. Hence, one needs to take steps to avoid 'aliasing'. Also, if a researcher wants to detect a lagged response between two variables, then the lag value will influence the sampling frequency (Imdadullah 2014).

Examples of studies that have employed the Spectral Analysis of Time Series Method are those that have investigated how sun spot activity varies over 11-year cycles (e.g., Bloomfield 1976; Shumway 1988). Other common examples include studies on celestial phenomena, weather patterns, neural activity, commodity prices, and economic activity.

Synergy Inquiry

The Synergy Inquiry Method is a collaborative action approach used to investigate change and also effectively bring about change. It is one of the most scientifically-proven effective ways of teaching students. Synergy is the idea that two or more options interact so that their combined effect is greater than the sum of their individual effects (Soanes and Stevenson 2004).

The method is an effective way for students to develop deep conceptual understandings, complex thinking skills, and enduring habits of mind using an inquiry-based approach. It was developed to address the challenges that people face in different endeavors of life. This form of inquiry belongs to the participatory action school. Its aim is to simultaneously make each person a researcher and the researched at the same time; the object and the subject; research for, by, and with people (Tang and Joiner 2006:6). The ideology behind the Synergy Inquiry Method is that fundamental pathologies exist at different levels of a social system and that every system suffers one or more forms of misconceptions. As a transformation inquiry, it changes consciousness by inculcating in individuals the practices that make a person to examine his/her own propositions, assumption, values, and beliefs. It challenges traditional research methods by balancing theory and practice that gives new insights of a person's self and of others. It is therefore a method of 'living theory and living action' directed at making participants both acquire and apply newly acquired skills and abilities. The underpinning notion of this mode of inquiry is that the universe evolves and by so doing reveals mysteries that are beyond human action and imagination. The Synergy Inquiry method therefore both guides human actions and equips them (learners) with the *how* to accommodate those mysteries (Tang and Joiner 2006).

The method has been applied by using modern technologies like the Internet, cellphones, and so on. It is employed to facilitate inquiry and cooperative learning. For example, Tang and Joiner (2006) conducted research using the method by exposing a teacher and her students to different types of online learning tools like blogs and discussion groups to share, test, and revise their ideas. The online was also used as a medium for sending information through Google drive, sharing ideas, post videos, as well as comment and peer edit one another's works via Turnitin.com. The teacher also used the online medium to send assignments and put up coursework that students needed for learning new things or retrieve materials or documents on lessons they possibly missed. The teacher also followed up with her students to get their opinions and feedback using the Internet medium called PollEverywhere.com where students can send answers as texts via cellphones.

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