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ABSTRACT

This paper presents a mixed-method evaluation design which utilizes concept mapping along with questionnaire and interviews. Recent developments in mixed-method evaluation have helped identify five purposes which mixed-method evaluation designs tend to serve. These are triangulation, complementarity, development, initiation, and expansion. The present paper discusses how the inclusion of concept mapping in designing and implementing an evaluation project can effectively strengthen the findings in line with each of these purposes. The design is presented with the help of three illustrative examples of evaluation and planning studies. A critical analysis of the purposes served by each of the components in these studies is presented within the framework of mixed-method design. This includes discussions on the characteristics of the methods, the importance of the sequence in which they are employed, and the variation in characteristics of how the methods are juxtaposed for each study. Three tables and four figures are included. (Contains 12 references.) (Author)

A Mixed-Method Design for Practical Purposes - Combination of Concept Mapping, Questionnaire and Interviews

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Mixed-Method Design

Recent literature on Mixed Method evaluation designs have called for a broader basis for mixing of methods (Greene, Caracelli, & Graham, 1989). Earlier literature on the topic called for the use of multiple methods as a means for enhancing the validity of inference from a study (Campbell & Fiske, 1959; Webb, Campbell, Schwartz, & Sechrest, 1966). In seeking to enhance validity of a study researchers employed two methods for the ostensible purpose of measuring the same construct. This trend has started to change with the call for critical multiplism (Cook, 1985; Mark & Shotland, 1987) and an attempt to combine methods as well as paradigms (Greene et al.). As a result, more and more evaluation studies are relying upon mixing quantitative and qualitative methods not just to enhance the validity of findings but to enhance the overall scope of a study. This is reflected in the review of 57 studies using mixed-method designs by Greene et al.

Greene et al. (1989) do an excellent job of classifying the studies according to five characteristic purposes for which mixed-method designs were used. These are: 1) Triangulation, 2) complementarity, 3) Development, 4) Initiation, and 5) Expansion. Of these, triangulation is the most common purpose for which mixed-method designs have been used previously. Through *triangulation* one seeks to enhance the validity of research findings by corroboration, convergence, or correspondence of results from different methods. In other words, different methods are employed to measure the same construct so that same results obtained from different methods would be harder to refute. *Complementarity* of methods occurs when the results from one method helps to enhance or clarify the results from another method. In *development*, the results from one method helps inform or develop the other methods. Discovery of paradox or contradiction, gaining new perspectives, and recasting of questions or results from one method with

questions or results from another method distinguish studies where *initiation* has been the purpose of using mixed-method designs. Finally, when different methods are used for different inquiry components to extend the breadth and range of inquiry, the purpose is termed as *expansion.* In trying to present a mixed-method design with concept mapping, questionnaire and interviews, Greene et al.'s paper is used here as the framework because of its extensive discussion of purpose and characteristics of mixed-method designs. The purposes may not always seem mutually exclusive nor should they be considered exhaustive. However, the intent of this paper being the presentation of a practical mixed-method design, laying the foundation for a modified theoretical framework remains beyond its scope.

A central feature of mixed-method designs is the combination of a qualitative and a quantitative method (Kidder & Fine, 1987; Greene et al., 1989). A typical example of such a design would be the combination of a questionnaire or a scale and interviews representing the quantitative and qualitative components respectively. Deviations from such a typical design are common too. A questionnaire may contain open-ended questions, the interviews may be highly structured and so on. Such deviations may highlight one of the components more than the other. However, the basic intention of expanding the scope of the design would remain. Such variations will be evident from the research designs presented in this paper.

Apart from the characteristics of the methods themselves the other important features that need to be considered are the sequential order in which the different components of the design are implemented and how each of the purposes listed in Greene et al. (1989) is served. The order in which the different methods are implemented has a direct bearing on the purpose of mixed-method designs. Some of the purposes are not served unless the methods are implemented either in sequence or concurrently. For instance, most of the studies reviewed by Green et al. reveal that sequential implementation was common among those seeking development or initiation. Concurrent

implementation on the other hand was more common among studies seeking complementarity.

Concept Mapping

In addition to the questionnaire and interview components of mixed-method designs, this paper proposes the inclusion of concept mapping in mixed-method designs as a third component to further enhance the scope of a study. Trochim (1989, p.1) provides the following definition of concept mapping:

> Concept mapping is a type of structured conceptualization which can be used by groups to develop a conceptual framework which can guide evaluation or planning.

The use of concept mapping can address several issues in mixed-method designs raised by Greene et al. (1989). The term 'development of a conceptual framework' used in the definition by Trochim (1989) can be specifically stated to include purposes such as informing the other methods (development), recasting of questions or gaining new perspectives (initiation), and expansion of breadth and range of inquiry (expansion). It is difficult, however, to characterize concept mapping as a strictly quantitative or a qualitative method. This issue has been raised by Trochim (1989) in the form of whether concept mapping is a soft science or a hard art. He discusses the difficulty of classifying it either as an exact science or as what is generally understood as an art form. He discusses the commonalties that concept mapping has with both science and art, and suggests that the dichotomy may remain and be accepted as such. In a similar vein, one may argue that the dichotomous nature of concept mapping, i.e., qualitative vís-a-vís quantitative, is hard to resolve. A look at the steps required for concept mapping explains this.

The process of concept mapping involves six steps (Trochim, 1989). These are:

1. Preparation including selection of participants and development of focus for the conceptualization.
2. Generation of statements.

3. Structuring of statements.
4. Representation of statements in the form of a concept map using multidimensional scaling and cluster analysis.
5. Interpretation of maps.
6. Utilization of maps.

Of these steps the fourth one is solely quantitative in nature and utilizes multivariate statistical methods to generate the actual concept maps. The third step has some elements of quantitative methods in that it requires the participants to rate and sort the statements generated in the second step according to their importance and similarity respectively. The other four steps are qualitative in nature. Each of these steps relies upon the qualitative judgment of the various stakeholders. For instance, the development of a focus statement may utilize the judgment of the administrative personnel, the generation of statements and interpretation of maps require the judgment of the participants, and finally, how the maps are to be utilized for evaluation purposes is determined by the participants in conjunction with the evaluator through discussions or negotiation.

From the preceding summary of the process of concept mapping, it is evident that the method by itself is a blend of qualitative and quantitative elements. Both elements play significant roles and are both required to make the process meaningful. In discussing the method characteristics in the following studies, concept mapping will therefore be characterized as mixed while the questionnaire will be characterized according to its content and the interviews as qualitative.

The rest of this paper is devoted to presenting three different studies exemplifying mixed-method design with concept mapping, questionnaire and interviews . The major thrust of the discussion will be highlighting the methodological aspects and less attention will be paid to the substantive issues. Discussions on each of these studies will contain: a) a brief description of the study, b) characteristics of the methods employed, c) the

sequence of implementation of different methods, and d) the characteristics of mixing of methods including the purposes of such mixing.

New York Academy of Medicine (NYAM)

This study was commissioned by the New York Academy of Medicine to evaluate their ongoing "Being Healthy!" (BH) program implemented in the middle schools of New York city (Trochim & SenGupta, 1993). The goals of this program were two-fold: 1) To implement a cost-effective model of comprehensive health education in selected intermediate and junior high schools for grades seven through nine, and 2) to coordinate the project with all other health education and health services initiatives in the schools at both the organizational and content levels. A major component of the implementation process was an intensive teacher training given each year to a new batch of teachers, administrators, and counselors from the selected schools. In addition, the project staff were available for consultation throughout the school year to help with any problem or difficulty arising from implementation of the curriculum.

At the time the evaluation project was undertaken the program had been running for five years. The goal of the project was to evaluate the effects of the Being Healthy! on the participating teachers[1]. In addition, the project also aimed at finding out, as much as possible, how the students, the parents, the community and the school administration were affected as a result of the implementation of "Being Healthy". Four major research questions were investigated in this project:

1. Prior Training - Before participating in Being Healthy! program, what experiences and skills did teachers and counselors have with regard to comprehensive health education?
2. Effects of Being Healthy! Training - How effective was the training provided by the Being Healthy! program?

[1]The term teacher will indicate the participants in general who include counselors and administrators in addition to teachers unless otherwise noted.

3. Effects of Program Participation - How has participating in the Being Healthy! program affected teachers' knowledge (e.g., about various aspects of health), attitudes (e.g., toward teaching, morale) and behavior (e.g., participation in their school, professional development, personal development)?
4. Observed Effects on Students - How has participating in Being Healthy! affected students (knowledge, attitude, behavior) from the perspective of the teachers?

A mixed-method approach was adopted to address the guiding research questions. In this particular study, where only a certain segment of the participants, namely, the teachers were available for eliciting information, the use of mixed-method design with as many sources of information as possible was necessary to enhance the scope of research. The stated methodological goals in this study were:

1. To contribute to the development of measures used in later stages of the evaluation (development).
2. To strengthen the findings of particular methods (triangulation).
3. To get a richer picture of a particular issue as explored in different stages of the evaluation through different methods (expansion).
4. To enhance and illustrate the findings of one method with the results of other methods (complementarity).
5. To allow for comparison with previously collected data.

The mixed method design consisted of four components. A summary of the methods and their characteristics are presented in Table 1. The participants in the "Being Healthy!" program formed the sampling frame for the study. The total number of such participants was two hundred and six. The questionnaire was sent to all the participants and the response rate was fifty per cent. A subsample of twelve participants were interviewed over the phone. The concept mapping session was conducted with sixteen

participants. The sequence in which the methods were implemented is summarized in Figure 1.

Method	Description	Characteristics
Questionnaire	A paper and pencil instrument consisting of both closed and open-ended questions.	Mixed
Interview	Extensive open-ended interviews with a subsample of teachers.	Qualitative
Concept Mapping	A one day session with a subsample of teachers.	Mixed
Existing Database	Analysis of relevant parts of the existing database comprising of data routinely collected by the New York Academy of Medicine from the BH participants.	Quantitative

Table 1 - Description and characteristics of methods used: NYAM

Part of the questionnaire addressed the same research questions that the interviews did. As a result, the analyses of interviews and questionnaire allowed for triangulation of findings. It may be noted that the main criterion for triangulation, i.e., different methods measuring the same phenomenon was fulfilled by the use of two equally important methods implemented independently. The purpose of complementarity was also served by the use of both questionnaire and interviews. Together, they provided the means to probe into different aspects of the research questions and many of the findings from the questionnaire (which had a much larger number of respondents) were enhanced and illustrated very well by the interviews in keeping with the stated purpose of complementarity. Expansion occurred through the emergence of a much richer picture of

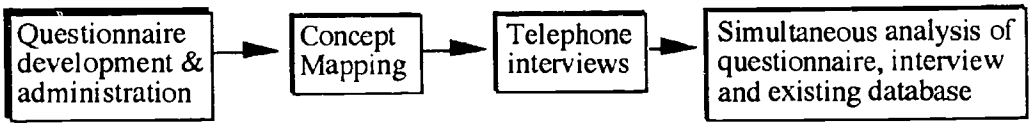

Figure 1 - Sequence of Implementation: NYAM

the evaluand as a result of using multiple methods (including the analysis of existing database) at different stages of the evaluation. Finally, the use of concept maps in analyzing the interview data as well as the responses to the open-ended questions served the purpose of development. The categories obtained in concept mapping provided the initial framework or coding scheme for the qualitative data. Statements obtained from the interviews and the questionnaire were categorized according to the concept mapping categories; new categories were started as and when a statement did not fit any of the existing categories. Not only was the analysis of the qualitative data more informed as a result of using the concept mapping categories, but the coding was made considerably easier for these data.

Tompkins Community Hospital (TCH)

This study was commissioned by the Tompkins Community Hospital - a county hospital in upstate New York, to evaluate their Clinical Technician program (Trochim, 1992). Like many other hospitals around the country TCH was faced with a growing shortage of nursing professionals during the 1980's. To meet this problem TCH embarked on an in-house training program to develop a second line of caregivers, termed the Clinical Technicians (CT), as support staff to the Registered Nurses (RN). The training was tailor-made for the hospital's needs and intended mostly for people who were already working in the hospital in some related positions. The aim was to maintain the same level and quality of care in the face of growing nursing shortage. In the first phase of the program the CTs were all employed in the Intensive Care Unit (ICU) where the ratio of the number of nurses to that of the patients was necessarily the highest and consequently the nursing shortage was the most acutely felt. At the time of the evaluation the second phase of the program had just started and CTs had been introduced in the Emergency Room.

The evaluation was undertaken by a group of students from Cornell University as part of a two semester-long evaluation practicum course. The goal of this evaluation was to determine how the productivity and employee satisfaction in the intensive care unit were affected by the Clinical Technician program. The major research questions investigated were:

a) Productivity -

1. Has there been a change in ICU productivity since the implementation of the CT program? If so, has there been an increase or a decrease in productivity?
2. What the RNs' and CTs' perceptions of productivity?

b) Employee Satisfaction -

1. What are the overall levels of job satisfaction and stress among RNs and CTs in the ICU? Is there a correlation between stress levels and job satisfaction? Does partnership with a CT increase or decrease a) job satisfaction, b) stress levels of RN?
2. What are the staff issues regarding the CT program?
3. What is the impact of the CT program on recruitment, retention and absenteeism of ICU staff?
4. Are there any significant unexpected effects and features of the CT program?

The overall research design for this study was a mixed-method one. However, within the sub-areas of productivity and employee satisfaction, the changes were measured using quasi-experimental designs (Cook & Campbell, 1979). The other aspects of the study such as, the perception and issues related to CT program were addressed through interviews and concept mapping. The stated methodological goals were similar to those of the NYAM study. The four components of the research design are presented in Table 2.

Method	Description	Characteristics
Questionnaire	A paper and pencil instrument consisting of closed-ended questions.	Quantitative
Interview	Semi-structured interviews with a subsample of nursing staff.	Qualitative
Concept Mapping	Two sessions with a subsample of nursing staff.	Mixed
Secondary Analysis of Data	Analysis of relevant parts of the existing database maintained by TCH. These included indices of productivity, absenteeism, retention and recruitment data.	Quantitative

Table 2 - Description and characteristics of methods used: TCH

The sampling frame for the study consisted of the nursing staff (both RNs and CTs) in the Intensive Care Unit. The questionnaire was given to all the RNs and CTs and the response rate was one hundred percent. Such high rate of response can be ascribed to the close nature of the study setting. Again all the nursing staff were interviewed and all of them participated in the concept mapping sessions along with the nursing administrator of the ICU. The sequence of implementation of different methods is presented in Figure 2.

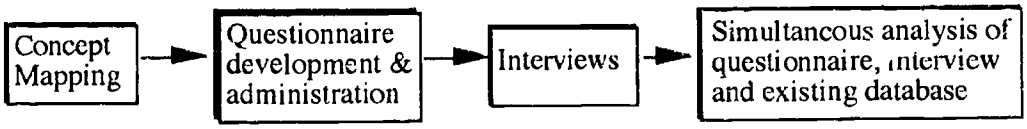

Figure 2 - Sequence of implementation: TCH

In this study, concept mapping played a key role in the conceptualization process. The categories obtained from concept mapping were utilized both in developing the questionnaire and structuring the interviews. While the questionnaire contained two sections on productivity and employee satisfaction, a third section consisted solely of

items which emerged from concept mapping. Similarly, some of the questions asked during the interviews were also based on the issues raised through concept mapping. The use of concept mapping results in such manner can lead to initiation as fresh perspectives may emerge through concept mapping and those can be probed further through interviews and questionnaire. This can happen in addition to serving the more obvious purpose of development when concept mapping is used in developing the other methods.

Descriptive analysis through the interviews complemented the analysis of the questionnaire response and the secondary analysis in this study. This study also provides a typical example of expansion as interviews were employed to assess the program processes while the quantitative methods were intended to find out about the program outcomes in terms of productivity. A combination of two quasi-experimental designs, viz., time series and non-equivalent control group design was used to assess the program outcome. While the time series data came from the ICU records (secondary analysis), the data for non-equivalent control group came from the Emergency Room records. The use of quasi-experimental designs helped answer the validity issues in assessing productivity and employee satisfaction outcomes while the interviews on the same topics provided the means for triangulation.

St. Catherine of Siena

The purpose of this study was strategic planning rather than evaluation. However, the particular mixed-method design employed in this study makes it worthwhile to mention in this paper as a planning counterpart to the ones mentioned so far. The St. Catherine of Siena Parish council embarked on a self-study strategic planning process to articulate its mission and long-term goals (Trochim et al., 1991). The overall planning process needed a total of six steps for completion. The second and third steps of this process which involved data collection and analysis respectively and were carried out by a parish appointed data gathering committee, are highlighted here. The data gathering

committee consisted of four volunteer parishioners in addition to five undergraduate students from Cornell University who participated under a program called the Faculty-Fellows-in-Service.

The data gathering committee was responsible only for data collection, analysis and formulating appropriate methodology to carry out such tasks. The committee decided on a mixed-method research design consisting of four components - concept mapping, focus groups, interviews, and a survey (questionnaire). The method characteristics are presented in Table 3.

Method	Description	Characteristics
Questionnaire	A paper and pencil instrument consisting of both open and closed-ended questions.	Mixed
Interview	Semi-structured interviews with a subsample of "key respondents".	Qualitative
Concept Mapping	Conducted with the parish council members	Mixed
Focus Groups	Conducted with the parishioners	Qualitative

Table 3 - Description and characteristics of methods used: St. Catherine of Siena

The concept mapping session was attended by the parish council members while the focus groups were attended by the parishioners. "Key respondents" for the interviews came from St. Catherine staff members, parish council members, parishioners, local community leaders, leaders of other faith groups, and leaders of nearby Catholic communities. The survey questionnaire was distributed among all parish-registered household and spouses. The response rate to the survey was twenty nine percent. The

Figure 3 - Sequence of Implementation: St. Catherine of Siena

sequence of implementation of different components of the study is shown in Figure 3.

In this study, concept mapping was used to develop the other three methods - focus groups, questionnaire for the survey, and structuring of the interviews. The analyses of data obtained through each of these methods were also guided by the concept mapping categories. While the interviewers and facilitators were responsible for summarizing the interviews and the issues that came up during the focus groups, thematic analyses of these summaries were based on the concept mapping categories. Similarly, the results from the survey were also categorized in terms of the major concept mapping themes. The use of different methods helped expand the breadth of the study and allowed a broad range of participants to highlight the different aspects of parish functioning. This increased the usefulness of the study findings in terms of developing a mission statement and strategic planning for the future.

Conclusion

The preceding discussion of three practical applications of mixed-method designs gives an idea of how concept mapping can be combined with questionnaire and interviews to strengthen mixed-method designs. Addition of existing database or focus groups can add a further dimension to the research findings. It may be noted that there are possibilities of several variations on a basic structure consisting of concept mapping, questionnaire and interviews. However, there are two basic variations that are apparent from the studies presented here. Both of these depend on how concept mapping is integrated into the research design.

The first of these variations is exemplified by the NYAM research design. In this study the development of other methods was independent of concept mapping. As a result, the position of concept mapping in the sequence of implementation was immaterial so long as it happened before the analysis and integration stage. Concept mapping helped

in this study in analysis and integration of results. The analysis was both informed and better organized by the use concept mapping. In this design, therefore, initiation if it occurs, can occur in a narrow sense, viz., recasting the results from one method with results from another method (Greene et al., 1989). Development can also occur in rather a narrow sense by virtue of other methods being better informed at the analysis stage by the results of concept mapping.

The manner in which concept mapping is used in the other two studies contrasts with the first variation in that concept mapping is used as a vehicle to lay a foundation to the study design. The intent of development is more clearly pronounced as is that of initiation. This is demonstrated very well in the St. Catherine study and to a lesser degree in the TCH study. In both these designs concept mapping's position in the sequence of implementation had to be in the first place. The research design in the St. Catherine study made all the other methods dependent on concept mapping from development through analysis and integration of results. This was in keeping with the planning intent of the study where the whole process started with a clean slate and it was important to obtain an insight into what the stakeholders were looking for. The evaluation intent of the TCH study necessitated a different approach in both development of and analysis of the results from the other methods. There was a clear focus in terms of the basic constructs that needed to be evaluated as well as the luxury of an existing database which allowed quasi-experimental designs to be functional within the purview of an overall mixed-method design. The developments of the questionnaire and the interview schedules were principally guided by the evaluation questions and well supplemented by the concept mapping categories.

A suggested mixed-method design involving concept mapping, questionnaire and interviews is presented in Figure 4. A fourth component, viz., previous data has been deliberately added to represent the studies presented in this paper. The fourth component is optional and if included, can be varied according to the needs of a particular study.

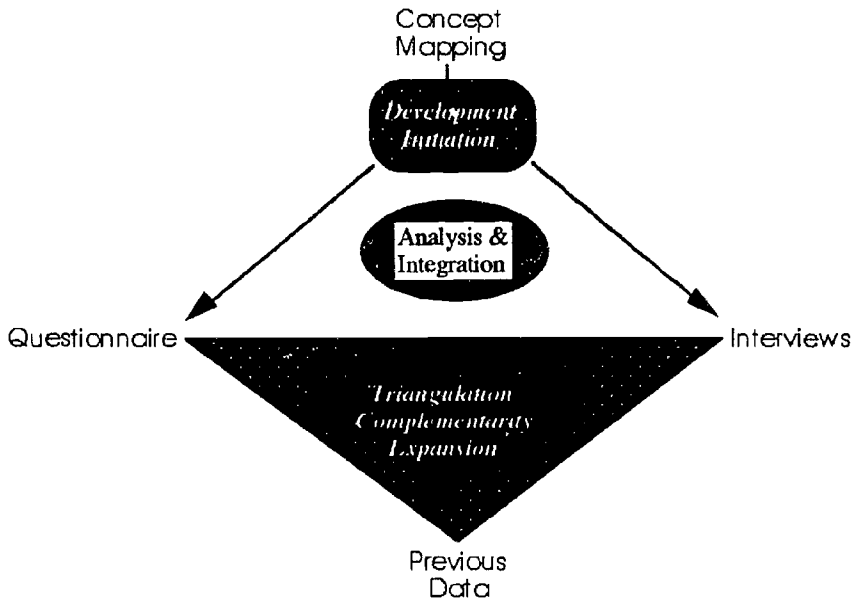

Figure 4 - Schematic diagram of a mixed-method design involving concept mapping, questionnaire and interviews.

Similarly, the nature of the questionnaire and the interviews is not fixed. The characteristics of the questionnaire especially, can vary from totally quantitative to completely qualitative. The diagram in Figure 4 also points out how the different purposes listed by Greene et al. (1989) can be served by this design. Again, the purpose of any given study will depend on its methodological goal; however, this design may prove suitable for any study with an emphasis on one of these purposes.

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