

CHAPTER III

METHODOLOGY

The purpose of this chapter is to describe the qualitative research methods used to investigate the issues, problems, and performance skills of first-year secondary science teachers. These inquiries provided distinct variables and sources of evidence that can benefit other first-year secondary science teachers.

The Qualitative Approach in Educational Research

Qualitative data detail and describe in-depth inquiry in the form of words rather than numbers. Information is directly from research subjects: personal perspectives are captured. Each case study is unique. The details and specific data that emerge reveal important dimensions of and interrelationships among genuine phenomena.

Qualitative research in education was once considered substandard or unscientific methodology (Howe, 1985, 1988), but recently this approach has gained legitimacy. Jackson (1990) asserted that the “kind of truth in case studies takes on a very different form than it once did” (p. 7).

The mission of research is not merely to search for conclusions, but also to accomplish a logical redirection of formal prescriptions and processes. Knowledge of schools, teachers, and students is derived from the process of inquiry, of asking questions and recording answers.

Merriam (1988) stated, “Qualitative research assumes that there are multiple realities--that the world is not an objective thing out there but a function of personal interaction and perceptions. It is a highly subjective phenomenon in need of interpreting rather than measuring”(p.17).

Qualitative research provides a means to view these multiple realities as well as a framework to reach the quantitative conclusions required by process-product research.

This study examined problems encountered by first-year secondary science teachers during their first year of the teaching.. These problems often prevented the teachers from understanding how to use simple methods and ideas to eliminate failure in the classroom.

Case studies are dictated by the program, institution, time, period, or set of events (Kratwohl 1993). The process provides for inductive reasoning via generalized analysis of data. This study provides facts, rationales, descriptions, and interconnecting concerns regarding individual

teachers and their administrators.

This study examines actions, support programs and, strategies employed by school-based administration to help teachers succeed during their first year on the job. It also investigates the common approaches used by the teachers to cope with the major problems associated with the first year.

Population and Sample

Population

The general population of this study was all of the certified first-year secondary science teachers in the state of North Carolina. The North Carolina Department of Public Instruction provided data on all teachers who had completed their first year of teaching. This data included each teacher's employment tenure, school administrative unit, identification number, certification area, classification of degrees, prior experience in other professional occupations relevant to certification in secondary science, and total years of teaching experience.

Table I depicts the total number of Local Educational Agencies in the state according to the identified (column one) Regional Technical

Assistance Center (TAC). Column two indicates the total first-year science teacher population in each TAC area. Column three gives the total number of first-year science teachers who left teaching before the end of their first year or taught at levels other than high school. Column four displays the number of first-year secondary science teachers who chose not to participate in the study. The final column displays the total number of first-year secondary science teachers who volunteered to be a part of this study. Of all of the first-year secondary science teachers in the state, eight (15.68 percent of the total of 51) participated in the study, which took into account variations such as rural/urban, number of schools, size of school, ethnicity and gender.

Table 1

Regional Technical Assistance Centers

TAC Region	Column 1	Column 2	Column 3	Column 4	Column 5
	Total LEAs	Total First- year Science Teachers per TAC	Total First-year Science Teachers out of teaching or at the other levels per TAC	Total First-year secondary science teachers non-sample per TAC	Total First-year secondary science teachers sample per TAC
Northeast	18	4	2	0	2
Southwest	17	6	4	1	1
Southeast	14	16	14	1	1
Central	19	15	13	0	2
Northwest	16	4	2	1	1
West	16	6	2	3	1
Totals	100	51	37	6	8

Sample

To qualify for this study, prospective participants (regardless of gender or ethnicity) were required (1) to be currently teaching science at the high school level; (2) to have completed their first full year of teaching science; and (3) to volunteer to participate in the study. The location of the administrative unit in which they taught also was taken into account to ensure that each of the state's geographic regions would be represented in the study. The eight first-year secondary science teachers who volunteered to participate represented 60 percent of the first-year secondary science teachers who were qualified to participate.

The sample represented all first-year secondary science teachers in the state who were teaching full time in a public school in the 1995-1996 school year. Each of these teachers had graduated from an accredited college in 1995 or had entered teaching from business or industry. The sample teachers were certified in general science (300), earth science (302), biology (310), physics (320) and chemistry (330).

North Carolina has 100 county school systems and 19 city school systems; the sample represented a cross-section of rural and metropolitan areas with small and large school systems. All eight first-year secondary

science teachers participating in the study were rehired for a second year and issued licenses by the North Carolina Department of Public Instruction for the 1996 school year.

All of the fourteen first-year secondary science teachers who qualified for the study were contacted via telephone by the researcher and given detailed information concerning all aspects of the study. The eight who agreed to participate in the study were contacted by telephone a second time. During the telephone conversation the identity and credentials of the researcher and the purpose of the study were revealed. In addition, each volunteer was asked to participate in a face-to-face interview. Each volunteer received a follow-up letter confirming a pre-set date for the interview. The letter detailed the time (after school) and location of the interview. Issues and problems encountered by first-year secondary science teachers were explored during the interview.

Data Collection

The framework for the study called for data from two sources: transcriptions of the audio-recorded interviews with the selected eight first-year secondary science teachers, and written responses to survey

questions submitted to the supervising administrator or lead teacher of each first-year secondary science teacher in the sample. The questions for the face-to-face interviews were divided into several categories: demographics, general concepts about teaching, science related concepts of teaching, content background, and programs available for first-year secondary science teachers.

The audio-tape recorder was placed in the center of the desk. Each interview took place in a room where noise and interruptions were minimal. Each participant received a copy of the letter of agreement along with a letter of introduction from the researcher for the administrator. Each informal interview lasted about one hour.

The researcher's letter listed the research questions, and included a request form to be submitted to the administrator or lead-teacher.

The survey information was given to the administrator or lead teacher after the interview with the teacher was completed. The participating administrators or lead teachers were asked to give information concerning future programs and effective tools for evaluating first-year secondary science teachers. A self-stamped addressed envelope was included. (Appendix B).

Data Analysis

Tesch (1990) suggested four purposes for qualitative research: (1) to study the characteristics of language, (2) to discover regularities of action, (3) to determine meaning through understanding of text or action, and (4) to discover patterns through reflection. In this study the continuum of analysis ranged from structured analysis of word patterns to holistic treatments of lasting solutions.

Some of the interviews were highly structured; others were unstructured. The highly structured interviews measured the responses of the participants. The unstructured interviews explored issues and responses. Merton, Fiske, and Kendall (1956) noted that focused interviews combined the exploratory (probing) questions along with the structured (measurable) questions.

The interviewing technique used in this study combined exploratory questions about programs and structured questions about disturbing or distracting incidents in the classroom. The focus was broad at first and narrowed over the course of the interview. (Appendix C).

Each interview was transcribed and classified according to several

criteria, including chronological events, places, and settings for analysis of individual experiences.

The information from both the teachers and the administrators revealed a need for continued in-service support for teaching skills enrichment. The surveys included framing questions having the context of issues, problems, behavior identification and in-service orientation programs for first-year secondary science teachers to formulate a structured display.

A survey secured from the administrator or department chairperson or lead teacher also was used to obtain data concerning problems regarding social organization and support teachers in the school (Appendix D). Miles and Huberman (1984) suggested a general overall pattern for analysis, using a content summary report provides greater information. Information from administrators concerning these first-year secondary science teachers summarizes and assisted with organization for categorizing key issues, problems, and behaviors. These data were arranged in a comparative pattern for coding and indexing. Strauss (1987) suggested coding as a way to get started by noting conditions, interactions, strategies or consequences. The data were grouped according to

interrelationships of variables, persons, events and strategies for behavior (organization patterns of experiences) using the case study surveys and responses.

These data results were aggregated in nominal rank order to provide an overview of the attitudes of the first-year secondary science teachers.

These data, collected directly from the first-year secondary science teachers, were utilized in the thematic conceptual triangulation matrix. The matrix was derived from clustered framing questions producing a tapestry of issues, problems and behaviors.

Data analysis included a thematic conceptual triangulation matrix method to generate an analysis for the different kinds of data and confirm information from different sources and data collection methods. The data triangulation method used a summary question analysis of each sample response along with the survey responses of the administrators and the analysis of the responses by the researcher. The findings supported agreement or disagreement for the framing questions showing a degree of corroboration on problems, issues, and programs for first-year secondary science teachers.

Denzin (1978) outlined three useful types of triangulation: (1) data

triangulation, using multiple sources of data across time, space, and persons; (2) investigator triangulation, using multiple investigators; and (3) method triangulation, using multiple methods. Mathison (1988) suggested that reliability rather than validation is often inconsistent and contrary to the findings. Mathison noted that triangulation provides insight to new insights while searching for explanations of the phenomenon.

This study used thematic conceptual data triangulation of barriers such as locations, problems dealing with discipline, and dilemmas of teaching strategies encountered, to compare the survey responses, interview questions, and different behaviors. Yin (1994) described this method as nonconvergence of multiple sources of evidence. The data analysis provided a better understanding of the problems, issues, and behaviors of the first-year secondary science teachers in North Carolina.

The display of these data was determined by the problems, issues, and behaviors. This thematic conceptual triangulation matrices was not ordered by persons or roles played, but rather through conceptual themes arranged according to principle, such as student discipline, classroom management, school climate, and support from administration. These principles inferred certain patterns, themes, and factors relating to first-

year secondary science teachers. This thematic conceptual triangulation matrix allowed crossing of lists, rows, columns while assisting with analyzing the flow and connection of events. Finally, the responses displayed on the thematic conceptual triangulation matrix linked components involved with issues and problems associated with teaching, and behaviors used to manage and control these problems. The matrix provided a visual characterization of patterns of agreement, and disagreement by the first-year secondary science teacher and their administrator.

Ethical Consideration

Ethics in research are the principles of right and wrong that a particular group accepts (Bogdan & Biklen, 1992). Most professional associations (e.g., National Educators Association, North Carolina Association of Educators) publish codes of ethics to help sensitize members to moral issues specific to their field of interest. Some codes of ethics are narrowly conceived to protect the professional group from attack rather than to set forth a moral position (Bogdan & Biklen, 1992).

With regards to research involving human subjects, two issues

dominate the current literature: informed consent and the protection of the subjects from harm. Guidelines published by academic institutions and governmental agencies emphasize that:

1. each subject in every study must participate voluntarily, understanding the purpose and nature of the study and the extent of dangers and obligations involved in the study;
2. no participant may be exposed to risks that are greater than the gains that may be derived from the research (Bogdan & Biklen, 1992).

The general principles of ethical research include the following:

1. The participants' identities must be protected so the published results of the study do not humiliate or harm the participant in any way. Anonymity must be extended to all records, written or electronically recorded, that are collected during the study.
2. Each participant must be treated with respect and informed of the researcher's interests. The participant must agree to participate in the study. The researcher must not lie to the participants nor record conversations on hidden mechanical devices.
3. The researcher must make clear the terms of the research and abide by the terms of the agreement.

4. The findings must be based on the data and truthfully reported.

This research study was conducted according to the guidelines listed above. The Letter of Confirmed Interview, served as informed consent. An Application for the Use of Human Subjects in Research was filed with the Institutional Review Board of Virginia Polytechnic Institute and State University.

Summary

The methodology of the research study followed a qualitative design and included triangulation of the data findings. The study identified the major problems encountered by first-year secondary science teachers. The data related to the support practices provided by school-based administration and district wide programs available to first-year secondary science teachers.

The goal of the study was to discover, develop, and provide a systematic analysis of the phenomenon of socialization confronting the first-year secondary science teacher. Results include substantive theories of the adequacy of the research process and the background needed for future research studies. Throughout the study, ethical considerations regarding participants and data guided both the research and the report of the findings.