Chapter 3 -- Procedures

As explained in Chapter 1, this study utilizes quantitative research methods to answer the research questions. This section contains a description of the research process involved.

Research approach

As stated earlier, the research is primarily descriptive in nature. The study relies on naturalistic techniques of inquiry to describe the "lived reality" of the novice science teacher as it relates to the research questions. To reiterate those research questions:

RQ1   What needs are important to the beginning science teacher?

RQ2   In what ways do novice science teachers think their preservice education has prepared them (or failed to prepare them) to meet these needs?

Research design

The course of research for this project was conducted in two phases, each with its own sample size and focus. Of course, it is hoped that the disparate methods will yield similar results, to promote the validity of those results. The following sections will discuss each phase in turn.

Small Group Study

Context of the Study

The subjects in the "small group" phase of the study were selected from undergraduates taking preservice science education courses at a large research university

in the southern United States. The program was slightly atypical in that the student in the program graduated with science degrees rather than education degrees. However, in terms of its structure, the curriculum for the teacher certification program was very similar to the traditional plan for such programs at large research universities. Students generally came into the program during the latter half of their undergraduate careers. In addition to the general education core curriculum, the prospective teachers had to take a number of classes unique to the study of education:

- At least one course in educational psychology
- A course about working with special needs students
- A course in technology for educators
- A course in instructional design
- A course in classroom management
- A "critical issues" course during the student teaching semester
- A science-specific "methods" course during the student teaching semester

The students were asked to participate in the study as they took their final "methods" class, and subsequently went through their student teaching experience. The participants were thus in the last semester of their preservice professional development prior to full-time teaching.

Sample population

Participants in the small group study were solicited via cover letters (see Appendix). With the course instructor's permission, the researcher personally described the project to the potential participants, along with a description of exactly what would be asked of them at each stage of the research, and how data generated would be handled and used. It was made clear to participants in all studies that their participation in the project was entirely voluntary, and that they could withdraw at any time. Six of the prospective teachers agreed to be in the Small Group Study, representing a wide

distribution of backgrounds. Four were women. Two were seeking certification in biology, two were seeking composite certification, and one was seeking certification in physics. The remaining student teacher was seeking both biology and composite certification. Four of the six already held baccalaureate degrees, in biology, chemistry, physics, and anthropology. One held a Master's degree in physics, and another was about to complete a Master's in molecular biology. Two of the collaborators already had instructional experience going into their student teaching.

Data collection procedures

The data from this phase of the study was qualitative in nature, generated by a variety of methods. With the course instructor's permission, the researcher was able to perform extended observations of preservice classroom activities. Collaborators were also asked to keep reflective journals of their experiences and feelings during the methods class. Such a journal could be of the traditional "notebook" type, an electronic journal sent by e-mail, or even tape-recorded, depending on which was most convenient for the participants. The majority of journal entries were via electronic mail to the instructor, who then provided the entries to the researcher. Hopefully, the process of keeping a journal proved beneficial to participants by giving them a chance for reflection and catharsis.

During the semester of the methods class, collaborators were asked to meet for two "focus group" sessions, each lasting about three hours. During the first part of each session, participants engaged in "brainstorming" activities regarding their thoughts on teaching in the initial session and how their methods class related to teaching in the second session. This was a process of "open coding" performed by the respondents themselves as they wrote their thoughts, impressions, and feelings on index cards. The future teachers then participated in the "constant comparison" phase of analysis (cf. Grove 1988) of these data by actively arranging their own cards and the cards of other collaborators into logical groups. These socially negotiated groups evolved into larger ideas, or "themes," to serve as the bases for the interview protocols. It was hoped that the

social interaction involved in this group process would lend the emergent themes a high degree of authenticity and power. The themes generated during the focus group sessions, and the resulting interview protocols, are presented in the next chapter.

Once the six prospective teachers began their student teaching, they were asked to participate in one-on-one structured interviews a few weeks into their student teaching experience. The questions for the interview were created from the themes generated during the first focus group session. The student teachers also continued their reflective journals. The second round of interviews for each participant began with a process of "member checking," wherein the collaborators heard the researcher's impressions of their thoughts, feelings and experiences during the first interview. The collaborators would then confirm, deny, or elaborate on those impressions. Once the member checking was complete, the second part of the second interview for each collaborator centered on the themes generated in the second brainstorming session. A third and final group of interviews involved member checking the researcher's impressions of the second interview. All of the first two interviews were conducted face to face, but the third interviews were conducted by phone for two of the participants.

All face-to-face interviews were audio taped with the full awareness and consent of the collaborators. Participants in the small group study were asked to select pseudonyms, and these pseudonyms will be used throughout the presentation of results. Information connecting subjects to their pseudonyms, as well as any audiotapes, were kept secure in a locked cabinet during the study when the researcher was not actively consulting them, and only the researcher had access to these materials. Interviews were transcribed by the researcher into a computer text document. Once a transcription was completed, the audiotape was erased. At the conclusion of the interview period, all information connecting respondents to their pseudonyms was destroyed. No record exists to connect collaborators to the data they generated.

Data analysis procedures

As stated earlier, data analysis during the two focus group sessions was performed in collaboration with the student teachers generating the data. The themes that emerged from these group sessions informed and guided the process of analysis for the other data, performed by the researcher.

The data from class observations, journals, and interviews were reduced using a process termed "axial coding" in Chapter 7 of Strauss and Corbin (1990). Axial coding differs from open coding (like what occurred during the group sessions) in that axial coding utilizes the categories generated by open coding as a framework to guide analysis. Instead of generating entirely new categories, axial coding seeks deeper knowledge of existing categories, expanding and broadening them. The purpose of axial coding is to discover what Strauss and Corbin (1990) term "sub-categories," information such as the conditions that create each category, the context of each category, the ways that people react to a category, and the consequences of those reactions. Naturally, some open coding occurred during this phase of analysis as well, discovering new themes that did not arise in the group sessions.

Due to the process of member checking, it is notable that for this type of qualitative research, much of the process of data analysis is concurrent with the collection of data. Interviews had to be coded very soon after they were conducted, to prepare for member checking in the next interview. The initial process of coding reduced the interview text to a sequence of fragmented statements by the interviewee. The researcher then interpreted these fragments as a series of simple declarative statements, for example, "You believe that solid content knowledge is essential to earn respect as a teacher" or "You found discussions with your fellow student teachers very helpful." During the next interview, the researcher read these declarative statements to the collaborators, who would then confirm, deny, or elaborate on the accuracy of the researcher's impressions. Alterations were made to the declarative statements in accordance with these comments.

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Once the interviews and member checking were complete for each participant, all member-checked declarative statements from that participant were assembled into a single document. The researcher read through all of the statements and looked for common themes. This is the synthesis that compliments the analysis of the original coding. Using the "cut and paste" function of word processing software, the researcher was able to physically arrange the statements into themed groups in a process of axial coding. Once all of the declarative statements were placed into themes, the statements were further rearranged within a theme to isolate the ideas within a theme. Once these "sub-themes" materialized, they formed the basis for the narrative of the student teacher's "lived reality." Even as the results of the interview coding were made into the declarative statements of member checking, these groups of statements were formed into the paragraphs of the narrative.

Once all of the participants' narratives were completed, the researcher re-read all of the narratives with a comparative eye, looking for common threads. If more than one narrative contained a theme, it was judged to be part of their common experience. Naturally, some threads were more common than others. These common threads then formed the basis of the data to address the research questions, and to make suggestions for practice. The narratives and common threads are presented in the next chapter.

Figure 1 graphically illustrates the process of data collection for the Small Group Study, and Figure 2 does the same for the process of analysis and synthesis.
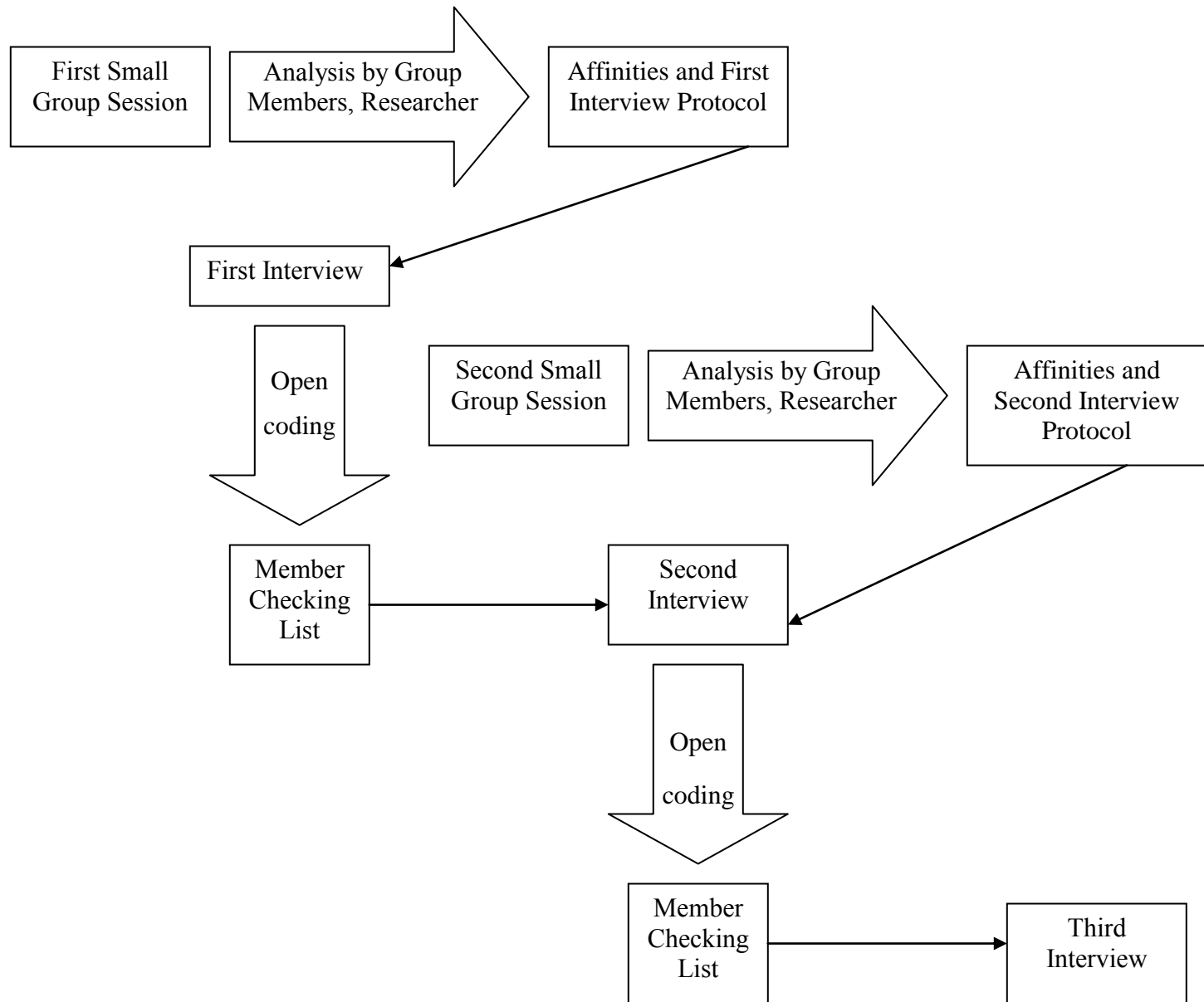
```
┌─────────────┐     ┌─────────────────┐          ┌─────────────────┐
│ First Small │     │ Analysis by Group│   ▷      │ Affinities and First│
│ Group Session│    │ Members, Researcher│        │ Interview Protocol │
└─────────────┘     └─────────────────┘          └─────────────────┘
```

First Small Group Session

Analysis by Group Members, Researcher

Affinities and First Interview Protocol

First Interview

Open coding

Second Small Group Session

Analysis by Group Members, Researcher

Affinities and Second Interview Protocol

Member Checking List

Second Interview

Open coding

Member Checking List

Third Interview

Figure 1. Process for data generation in the Small Group Study

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First Interview

Second Interview

Third Interview

Analysis by
Open and
Axial
Coding

Group of
Recurring Ideas /
Themes

Narrative
Synthesis

Individual
Narrative #2

Individual
Narrative #3

Individual
Narrative #4

Individual
Narrative #5

Analysis by Cross-comparison

Individual
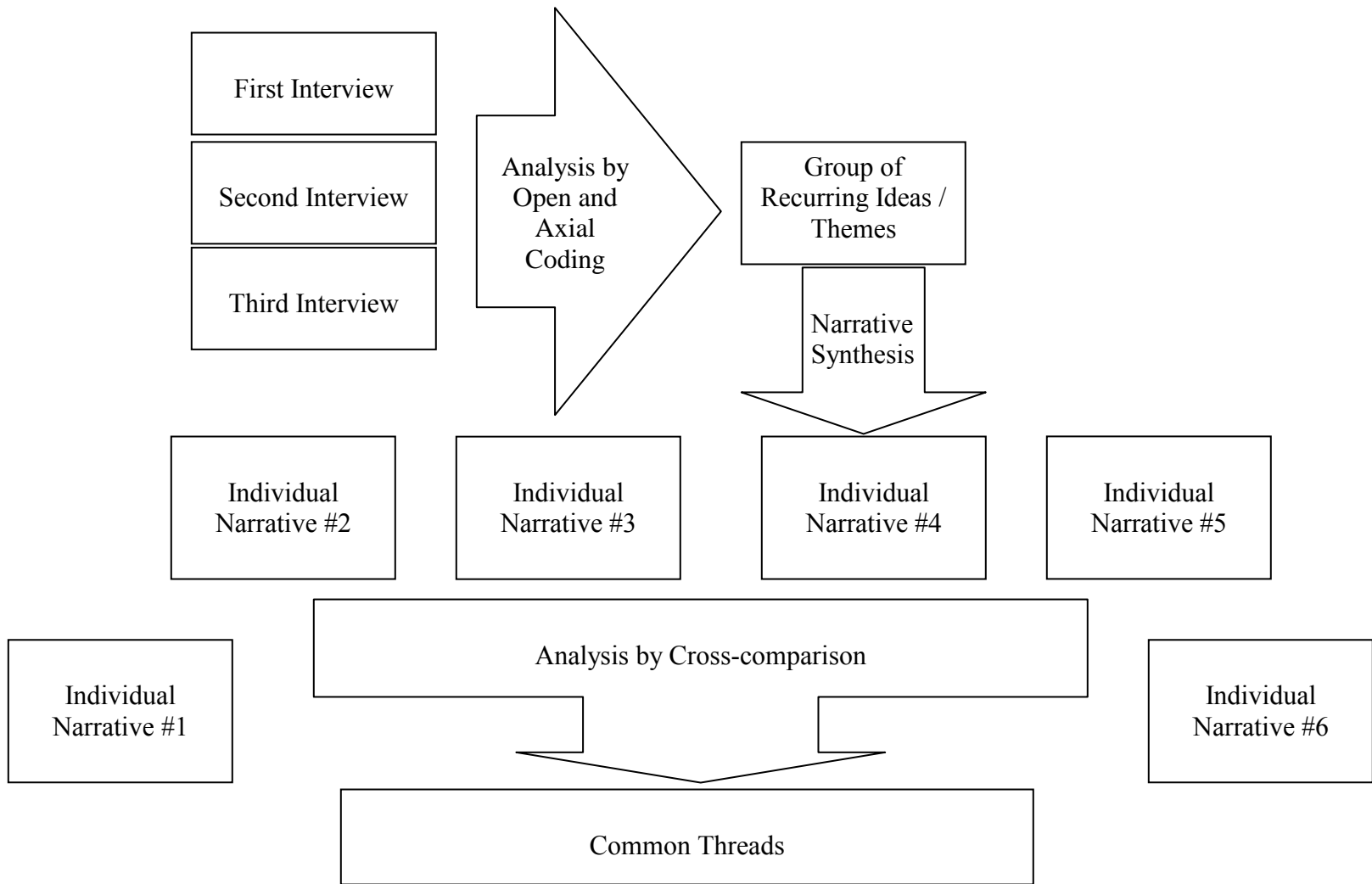Narrative #1

Individual
Narrative #6

Common Threads

Figure 2. Process of analysis and synthesis for Small Group Study

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Focused Naturalistic Study

Sample population

One of the students that participated in the small group study was hired as a full-time teacher of secondary science in the central Texas area and agreed to participate in the focused qualitative study during his first year of full-time teaching. The longitudinal nature of the study was greatly enhanced by achieving this continuity. The participant was informed of the research process, both in a cover letter and in person. It was made clear to the collaborator in all studies that his participation in the project was entirely voluntary, and that he could withdraw at any time. A copy of the cover letter is included in the Appendices.

Data collection procedures

The data in this phase of the study was generated by a series of eight regular open-ended interviews, approximately once a month. The interviews were modeled after the "Informal Conversational Interview" described in Patton (1990, pp. 20-28). Such an interview is open-ended in that there are few pre-planned questions; most of the questions in each interview will arise during the course of the interview process. One strength of this approach to interviewing is the flexibility and responsiveness available to the interviewer. The interview becomes more a conversation than a survey, allowing for deeper mutual understanding between the researcher and the interviewee. Patton (1990, p. 281) notes that such a process is excellent for the type of extended contact that will be an integral part of this phase. The "big questions" for each interview were of the "Experience/Behavior," "Opinion/Values," and "Feeling" types from Patton (1990, pp. 290-291), and were of the general form "What experiences, good or bad, have you had recently in your teaching?" and "In what ways did your preservice education prepare you, or fail to prepare you, for these experiences?" Other questions followed from responses to these questions, as the conversational process unfolded. Later interviews also involved the "member checking" process described in the Small Group Study, asking the

collaborator to confirm, deny or elaborate on the researcher's impressions of past interviews.

The collaborator retained his pseudonym from the Small Group Study. All interviews were audio taped will full knowledge and consent of the collaborator. Once the study was completed, all records connecting the collaborator with his pseudonym were destroyed.

Data analysis procedures

The transcripts of the interviews were subjected to a process of open coding that isolated discrete units of text from the transcripts in the form of incidents, feelings, and ideas. These discrete units of data were placed into a separate computer text file. This new computer document evolved into a list of "main ideas" for that interview. One important function of this list was to serve as an aid to the member checking process: during the next scheduled interview, the first order of business was to go over the list with the participant, soliciting spoken confirmation of the researcher's interpretations of each item. If the participant disagreed with the researcher's interpretations, he or she was asked to elaborate and correct the researcher. This process of member checking is an indispensable tool for constructing a mutual understanding between the researcher and the participant of the "lived reality" of the teacher's experiences. Any elaborations offered by the participant during the member checking process were interpreted by the researcher after the analysis of that interview, and were themselves member checked in future interviews.

Once the items on the list of "main ideas" were confirmed by member checking, the process of open coding continued with the ordering of the ideas into logical categories. Computer word processing technology greatly facilitated this process, since ideas can be moved around on the screen via "cut-and-paste," or individual ideas can be printed out for physical arrangement into categories. Once the ideas were arranged into logically consistent categories, those categories were assigned descriptive labels.

Naturally, this was an iterative process; as expected, membership and labeling of categories were quite fluid before they finally stabilized.

As the study progressed, comparisons were made between the lists of main ideas that emerged from each interview. These comparisons resulted in a "master list" of ideas generated by the Focused Study. These ideas and the connections among them were woven into a narrative, in a process similar to that described above, comprising a "story" of the "lived reality" of the first-year teacher, and the relevance of the teacher's preservice education to the experiences of that first year.

Since only one teacher was willing and able to be interviewed for the Focused Study, there is no opportunity for comparison to other teachers as there was in the Small Group Study. However, the results of the two studies can be compared to see if the collaborator's felt needs as a teacher, and his attitudes about the effectiveness of preservice education, evolved with time and experience. I will look for similarities and differences between the results of each phase, and these similarities and differences, along with elaborations, theoretical explanations, and suggestions for practice, will be summarized in the final section.

Theoretical Basis for Qualitative Study

The underlying philosophy of this qualitative study is the philosophy of *phenomenology*. According to Patton (1990, pp. 68-71), phenomenology is concerned with "how people describe things and experience them through their senses." Phenomenological inquiry focuses on the structure and essence of experience of a certain phenomenon for a certain group of people. In the case of this study, the "phenomenon" is the approximately eighteen-month long process of preservice education and the first year of teaching. Phenomenology rejects the notion that there is an objective reality for people; people's experiences are paramount in importance. Therefore, this study is

concerned with discovering the "lived reality" of preservice students as they become teachers.

Unfortunately, the researcher cannot directly know the "lived reality" of the beginning teachers, so this study requires the addition of the concept of *constructivism*. We can seek to understand the "lived reality" of the first-year teacher effectively by realizing that this "reality" is constructed in the mind of the teacher, tying new experiences to old as his or her career unfolds. A researcher seeking to understand this personally constructed reality must enter into a dialogue with the teacher and construct a mutual understanding of the teacher's experiences. Naturalistic techniques of inquiry, with their emphasis on multiple realities and the "construction" of a common reality based on shared experiences between researcher and "researched," (Erlandson, et al. 1993, pp. 11-12) are appropriate to make these constructions. The researcher must strive to confirm the accuracy of his or her perception of this shared construction, by constantly consulting with the teacher.

More traditional studies attempt to test predetermined hypotheses, and focus on asking questions that relate to those hypotheses. Such practices, however, run the risk of incorporating too much of the researcher's attitudes and beliefs into the "shared" experience between researcher and collaborators. This deductive approach runs the risk of "pigeon holing" the experiences of participants with *a priori* theories (Patton, 1990, pp. 44-46). Baird and Rowsey (1989) make this admission about the limitations of their survey:

> The… items selected for this survey represent only a subset of perceived needs which would be obtained through an open-ended survey instrument. [Use of] a scan form… constrains the quality of the… data by filtering response choices and preventing the addition of needs by respondents. (p. 276)

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This study seeks to take a more inductive approach; rather than "test" for pre-determined themes, it is expected that themes will emerge from the course of the study itself. By this process, theories about the experiences of preservice and first-year teachers are "grounded" in those shared experiences as they unfold. As noted by Strauss and Corbin (1990) grounded theory research is exceedingly non-linear in nature: processes of data collection, data analysis, and formulation of theory are constantly relating to each other in a reciprocal manner.

Steps to insure the quality of the study

Every researcher faces the challenge of conducting a study so that the results will be perceived as useful (and therefore viewed favorably) by those who see the results. Quantitative research uses a variety of time-honored methods to meet these demands: prime examples include random sampling, standardization, and quotation of constructs such as reliability coefficients. Qualitative methods, by their very nature, must reject most of these methods, and proponents of qualitative research have sought to develop their own standards for "quality" research.

Standards such as those presented in Chapters 2 and 7 of Erlandson, et al. (1993) were used to guide this research. They see "quality" research with a constructivist philosophy as having three overarching standards. This section will describe each of these standards in turn, as well as the methods employed to meet them.

"Trustworthiness"

Research is a process by which the researcher serves as an intermediary between two groups that normally would have no contact: those who have participated in the research, and those who read the research report. The researcher is an ambassador or interpreter of sorts, and, like all ambassadors and interpreters, is the focus of a great deal of trust. But personal agendas can shape what the researcher reports, and even what he or she "sees." Even "traditional" research in the natural sciences has been prone to the

influence of personal agendas; one of the most famous examples is the "evidence" of the "canals" of Mars found by the American amateur astronomer Percival Lowell. Lowell wished so much to find evidence of an alien civilization that he interpreted a random assemblage of colorations on the surface of Mars as straight lines connecting great cities visible from tens of million of miles away! Most personal agendas are subconscious and lacking in sinister intent, but to deny their existence and influence is to deny the humanity of the researcher. How then can we invest trust in any piece of reported research?

Erlandson, et al. (1993) provide a guide:

If intellectual inquiry is to have an impact on human knowledge … it must guarantee some measure of credibility about what it has inquired, must communicate in a manner that will enable application by its intended audience, and must enable its audience to check on its findings and the inquiry process by which the findings were obtained. (p. 28)

Erlandson, et al. (1993) propose several tools to make a naturalistic study more trustworthy. This study employs the following:

• *Member checking* seeks to insure the credibility of research. As a researcher gathers information, the data pass through a series of "filters," arising not only from the limitations of his or her senses, but also from the researcher's experiences and attitudes. This filtering process can cause the researcher's constructions to drift from those professed by others participating in the research. The technique of member checking deals with "construct drift" by the conceptually simple expedient of asking research respondents to evaluate the researcher's constructs. In this project, member checking was a regular part of the interviewing process: major portions of follow-up interviews were spent asking interviewees to confirm, critique, or correct the researcher's interpretations of their words from previous interviews, and even from earlier in the same interview.

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• *Triangulation* also speaks to credibility. It is the process of generating data from a variety of sources, at a variety of times, employing a variety of methods. This study will generate data using a wide variety of methods: reflective journals, classroom observations, structured and open-ended interviews, and group brainstorming sessions. If data generated across this wide range can lead to similar conclusions, the study can be considered very credible.

• *Prolonged engagement* involves interacting with one's respondents for an extended period of time. The longitudinal nature of the qualitative portion of this project, extending as it does over more than an entire calendar year, offers a tremendous opportunity for prolonged engagement with collaborators. Not only is this an aid to triangulation (see above), but prolonged engagement also builds an atmosphere of comfort and trust. The hope of prolonged engagement is that all involved will drop facades and dig deep for truthful, complete, and personal constructs. Although Fuller and Bown (1975) contend that teachers are "loathe to report their feelings," this researcher began the project with the hope that his status as a fellow classroom teacher (as opposed to a university professor or graduate teaching assistant) would encourage the student teachers in the study to be candid. The researcher was not affiliated with the certification program in any way, and thus was not in a position of power over the collaborators. It was hoped that this would foster an atmosphere of openness and trust.

• The process of *thick description* works to assist with transferability. More traditional quantitative methods of inquiry attempt to achieve "generalizability" by determining differences between contexts and "eliminating" them through techniques such as bell curve standardization. The very process of standardization, however, may contain inherent biases and selection effects, which will damage the generalizability of results. The naturalistic researcher attempts to help the reader make an informed decision about the study's transferability by providing a detailed ("thick") description of both the context of the study, and the results of the study. This researcher will try to provide as

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complete a description of collaborators, their experiences, and the context of those experiences as possible, without compromising the confidentiality of participants.

• Although Erlandson and associates do not specifically mention it as such, the *person as instrument statement* can be a valuable tool for establishing trustworthiness. A major portion of the typical report arising from traditional quantitative research is devoted to describing the research instruments, such as the test or survey employed, delineating such properties as its "reliability," its "validity," and its philosophical basis. In naturalistic research, however, the *researcher* is the instrument (see, for example, Erlandson, et al. 1993, p. 39). Therefore, it seems only sensible that naturalistic researchers include in their reports statements about themselves, describing the experiences, attitudes, and assumptions that might influence their constructions. The construction of such a statement is a highly self-reflective process. The process is also iterative, since researchers are, after all, people, and subject to personal change, evolution, and (one hopes) growth. Of course, human beings are so complex that a few paragraphs cannot fully describe them, but the person as instrument statement should represent a good-faith effort to "come clean" about the internal forces that shape (some would say "bias") one's research. A formal person as instrument statement for this researcher is included in the Appendices.

• The *audit trail* consists of all the physical documentation produced by the study. Many of the tools described above produce such documents: interview transcripts, minutes of peer debriefing meetings, the reflective journal, and the person as instrument statement, to name a few. Documents used for the actual study, such as survey instruments and letters of consent, are also valid elements of the audit trail. Documents produced during the data analysis can give an auditor insight into the researcher's analysis process. The audit trail can lend support to all elements of trustworthiness, but especially bolsters dependability and confirmability, by allowing the auditor insight into the mechanics of the research and the personality of the researcher. Except as noted above to

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guard the confidentiality of participants, the researcher will preserve all records of data collection and analysis for inspection.

"Authenticity"

To Erlandson, et al. (1993) trustworthiness alone is not sufficient to insure "quality" research. Attention must also be paid to a study's "authenticity," or how well it adheres to the tenets of naturalistic inquiry, by striving to present the perspectives of its participants. As mentioned earlier, foremost among those tenets is the assertion that individuals construct their own versions of "reality" in their own ways. In the absence of an "Absolute Reality" knowable by the human mind, each of these personal constructs is equally valid and deserving of equal status. The researcher must be constantly aware of the need to apply this standard of *fairness* in this project. For this study, all respondents were equal in the researcher's eyes, regardless of race, gender, social class, or age. All respondents had something important to contribute to the study, and all of them did so contribute.

"Ethical Integrity"

The final component of quality research is its ethical integrity. A major complaint leveled at traditional research in human situations is that the research processes can "dehumanize" the "subjects" of the research, treating them as if they were microbes on a slide. A study's ethical integrity is a measure of how much it acknowledges and respects the feelings, dignity, and "humanity" of those who assist the researcher. Such concerns are not only idealistic and moral, but also pragmatic: microbes, stars, and atoms do not care how they are treated, but people often do. Someone who finds research a dehumanizing experience will be less likely to be honest and forthcoming with researchers in the future, and may not participate in research at all. The words of Fuller and Bown (1975), quoted earlier, about how teachers react to the perception that education research is not their "friend," should serve as a reminder to all researchers to treat teachers with respect. Researchers have a practical stake in preserving the dignity of their "subjects," lest they rob themselves of opportunities to do useful research!

The language researchers use is very powerful in displaying their ethical bent. A statement that one is doing research "on" "subjects" points to an objectifying attitude. While for the most part such attitudes are subconscious and unintentional, they can shine through nonetheless. The preposition "with" is much more inclusive than "on," suggesting that research is a collaborative effort involving shared constructs.

We must also search for a word that refers to the "researchees" in a humanizing, empowering manner. For this study, the term "respondents" is rejected, as it conjures up images of behaviorist stimulus-response reactions. The popular "informants" is also rejected because of its pejorative implications in American colloquial English; after the interviews are done, should they be placed in the Witness Protection Program? The researcher has decided upon the terms "collaborators" and "participants" as inclusive, empowering, and, most importantly, truly descriptive of what these honest, forthcoming human beings have contributed to this study. These terms shall be used exclusively for the remainder of this report. Such a concern with "humanization" should also extend to the researcher; to this end, and to avoid awkward use of the passive voice, the researcher shall be referred to in the first person where appropriate for the remainder of this report.

Erlandson, et al. (1993, p. 155) list other criteria for ethical integrity. I will take extensive measures to protect the *privacy* and *confidentiality* of my collaborators in all parts of the study. The adoption of pseudonyms by collaborators in both phases will be an important safeguard for confidentiality. I will refer to collaborators by pseudonyms in all documentation, and I will destroy any documents that connect the pseudonyms to the real names. I will keep all tape recordings of interviews in a secure place before transcription, and erase each tape recording soon after transcription.

To some degree, the researcher must dance a fine line between thick description and maintenance of confidentiality. If descriptions of collaborators and the research are too "thick," the confidentiality of some collaborators could be compromised. I feel this

was especially relevant during the focused qualitative study, since the participant was not afforded the anonymity of a group setting. To this end, I avoid physical descriptions of my collaborators, descriptions of locations where interviews took place, and descriptions of collaborators' personalities, beyond the evidence of their words. I also did not engage in classroom observation in the focused study, so as not to make administrators aware that the collaborator was part of a research project. While these omissions may detract from the quality of the study, by reducing the thickness of the descriptions and level of triangulation, it is a worthy sacrifice for the sake of confidentiality and collaborator openness.

Researchers must also do all that is in their power to keep collaborators as involved in and informed about the research process as possible, and to always act with the consent of the collaborators. *Informed consent* is often difficult to maintain, especially as a study evolves with concordant twists and turns. I worked diligently to keep my collaborators informed about the progress of my research during both phases. The initial consent letters were only the start; prior to each interview, I informed the collaborator about what I did to prepare for the interview, what I wished to do during the interview, and what I would do with the interview information. Where possible, collaborators were asked to look at the summaries of their contributions, and asked for elaboration and approval. The process of member checking greatly facilitated this connection between the participants and myself. I wanted the effort to be truly interactive, and for my collaborators to be as involved as they wanted to be.

Assumptions and limitations of the research paradigm

Perhaps the greatest assumption of this research project, and of all qualitative inquiry, lies in the *honesty* of all participants. Naturally, the researcher must be honest, in working with collaborators, protecting their confidentiality, and in reporting results to readers. Even in more traditional research, there is a tacit assumption that the data reported by the researcher is authentic and not "made up" by the researcher. Since

numbers can be falsified as well as narrative, it is not unreasonable to expect that this same trust will be extended to qualitative research.

Trust is a two-way street, however; there is always the possibility that *collaborators* will "make up" incidents and feelings, and report these fictions as fact to the researcher. Certainly, not all of these fictions have malefic intent: collaborators may be intent on pleasing the researcher, interested in appearing more "interesting," determined to persuade the researcher to adopt their way of thinking, or fearful of reprisals from authorities. All the researcher can do is try to cultivate a judgment-free atmosphere focusing on detachment, openness, safety, and complete confidentiality. Once the researcher has done all this, he or she must invest a great deal of trust in the honesty of collaborators, and put misgivings aside.

The "third party" in research, the reader, must invest trust in both the researcher and his collaborators. The various components of "quality" research, listed above, provide a foundation for this trust. The Latin phrase, *caveat emptor*, is a warning merely to be careful when purchasing, not an injunction to avoid commerce. In a similar vein, I offer the phrase *caveat lector,* "Let the reader beware."

The theme of *critical reflection* resonates through all aspects of this study. All collaborators, including the researcher, were asked to think back upon and critically examine their own thoughts, feelings, and experiences. This study therefore assumes that critical reflection will be a useful tool for discovering the "lived reality" of teachers. As Brookfield (1987) points out, this is occasionally a difficult and even painful process for people. However, authors such as MacKinnon (1987), Baird, Fensham, Gunstone, and White (1991), and Brookfield himself (1990, 1995) point out the usefulness of reflection in allowing teachers a chance to examine and improve their teaching. Therefore, despite potential difficulties, the assumption of the utility of critical reflection is probably a strong one.

One limitation of this study is a limitation common to many studies in the social sciences. In the strictest sense, the results of this study are only "generalizable" to the actual people participating in the study, the contexts in which the study took place, and the time period of the study. People change over time: they have different experiences, and may change their attitudes and feelings as a result. Similarly, no two people can be reasonably expected to react the same way to even identical situations. However, research in the social sciences is still worth doing. If descriptions are detailed enough and narrative vivid enough, hopefully a reader will find something familiar in the research report, and find some results useful. This researcher disavows any pretense of complete generalizability, but hopes that readers will nonetheless find the results of this research useful.

Another potential limitation has been discussed in the previous section. There is a possibility that the researcher's description of collaborators and their physical settings may be so "thick" that these descriptions will compromise the confidentiality of the collaborators. Such a compromise could diminish the atmosphere of openness and honesty vital to the generation of quality data. Therefore, it may be necessary to reduce the level of description to enhance confidentiality. This may slightly hamper the ability of some readers to apply the results of this research to their situations.