

A PHENOMENOGRAPHIC ANALYSIS OF ELEMENTARY TEACHER
CANDIDATES' CONCEPTIONS OF GEOGRAPHY

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A PHENOMENOGRAPHIC ANALYSIS OF ELEMENTARY TEACHER
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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iv
LIST OF TABLES	xi
LIST OF FIGURES	xii
ABSTRACT	xiii
CHAPTER 1 INTRODUCTION	1
Statement of Purpose	4
Statement of the Research Questions	5
Definitions of Terms	5
Potential Policy Implications	9
Scope	10
Summary	13
CHAPTER 2 REVIEW OF THE LITERATURE	15
2.1 Introduction	15
2.1.1 Standards-based Geography	16
2.1.2 Teacher as the Curricular-Instructional Gatekeeper	16
2.1.3 Preservice Geography Teacher Education	16
2.1.4 Approaches to the Understanding of Learning	16
2.1.5 Conceptions of Learning and Phenomenography	17
2.2 Standards-based Geography	17
2.3 The Teacher as the Curricular-Instructional Gatekeeper	20

2.4 Geography Teacher Education for ETCs	21
2.5 Approaches to the Understanding of Learning.....	25
2.5.1 Behaviorism	30
2.5.2 Relevant Educational Psychology.....	31
2.5.3 Constructivism	32
2.5.4 Social-Constructivist Conceptions	33
2.5.5 Educational Constructivism	34
2.5.6 Individual Constructivism.....	36
2.5.7 Social Constructivism	36
2.5.8 Sociocultural Theory.....	39
2.5.9 Bruner and Vygotsky	39
2.5.10 Criticisms of these Approaches.....	41
2.6 Learner Variance	43
2.7 Conceptions of Learning and Phenomenography.....	45
2.8 Phenomenography	51
2.8.1 Phenomenography: An Approach to Research in Education.....	52
2.8.2 Phenomenography in Practice.....	55
2.8.3 Phenomenography and Phenomenology.....	56
2.8.4 The Issue of Truthfulness.....	58
2.9 Summary.....	59
CHAPTER 3 RESEARCH METHODS	61
3.1 Introduction	61
3.2 Statement of Purpose and Research Questions	62
3.3 Research Strategy	63

3.4 Role of the Researcher.....	63
3.5 Ethical Issues in Data Collection.....	65
3.6 Validity and Reliability	65
3.6.1 Validity.....	67
3.6.2 Reliability.....	69
3.6.3 Specific Strategies for Validating Findings	69
3.7 Phenomenographic Analysis	71
3.7.1 Setting	71
3.7.2 Professional Development School I.....	72
3.8 Phase One of the Study.....	72
3.8.1 Data Collection.....	72
3.8.2 Data Generation	73
3.9 Phase Two of the Study	75
3.9.1 Data Collection.....	76
3.9.2 Data Generation	76
3.9.3 Phase Two Process Illustrated.....	77
3.10 Summary.....	79
CHAPTER 4 ANALYSIS.....	81
4.1 Introduction	81
4.2 Findings for Phase One Analysis	82
4.2.1 Phase One Participants.....	82
4.2.2 Specific Description of Participant Population	83
4.2.3 Disclosure of Travel Experiences	89
4.2.4 Phase One Analysis.....	91
4.3 Major Conceptions	93

4.4 Minor Conceptions	94
4.5 Referential and Structural Conceptions of Geography.....	94
4.5.1 Continents and Oceans.....	95
4.5.2 States	96
4.5.3 Education centric.....	96
4.5.4 Maps.....	96
4.5.5 Application and Affect.....	97
4.5.6 Deep(er) Geography.....	97
4.5.7 Environs	98
4.6 Summary.....	98
4.7 Phenomenographic Approach to Phase One Data.....	99
4.7.1 Background Specific Interpretation of the Data.....	99
4.7.2 Geography–Centric Interpretation of the Data.....	100
4.7.3 Teacher–Centric Interpretation of the Data.....	103
4.8 Resolving Differences	105
4.9 Findings for Phase Two.....	106
4.9.1 Phase Two Participants	106
4.9.2 Specific Description of Phase Two Participant Population	107
4.9.3 Phase Two Participant Travel Experiences.....	113
4.9.4 Phase Two Data Analysis	115
4.10 Conceptions of Geography	118
4.10.1 Conception 1: Geography as the study of places and people.....	121
4.10.2 Conception 2: Geography as the study of the world.....	121
4.10.3 Conception 3: Geography as the study of the world’s interactions	122
4.10.4 Conceptions of Learning Geography	123

4.11 Summary.....	129
CHAPTER 5 CONCLUSIONS, CONTRIBUTIONS TO THE LITERATURE AND IMPLICATIONS.....	130
5.1 Introduction	130
5.2 Review of Research Design and Data Collection.....	131
5.3 Conclusions	133
5.3.1 Conceptions of Geography.....	134
5.3.2 Conceptions of Learning Geography	137
5.3.3 Subsidiary Questions.....	142
5.4 Contributions to the Literature	146
5.5 Implications and Recommendations.....	149
5.5.1. Geographic Education Policy Implications.....	155
5.5.2 Awareness of University Geography Faculty	155
5.5.3 Accountability in Social Studies Education.....	156
5.5.4 Teacher Education in General.....	156
5.5.5 Setting Specific	156
5.5.6 Geographic Alliances	156
5.5.7 Confront Deficiencies and Multiple Understandings.....	157
5.6 The Experience of Phenomenographic Analysis.....	157
5.7 A Final Statement	160
REFERENCE LIST	162
APPENDIX A PHASE TWO QUESTION PROMPT FORM.....	174
APPENDIX B PHASE ONE SURVEY INSTRUCTIONS	177
APPENDIX C INSTRUCTIONS FOR ANALYZING PHASE ONE DATA.....	180
Background.....	180
Expected Outcomes	180

Criteria.....	181
Specific Instructions to the Reviewer.....	182

LIST OF TABLES

Table	Page
1. Theoretical Approaches to the Study of Learning	29
2. Common Social Constructivist Beliefs adapted from Gredler 2001	38
3. Bruner's Stages of Cognitive Development	40
4. Models of Learning Conceptions.....	48
5. Comparative Summary of Phenomenography and Phenomenology	57
6. Validity Rubric based on Sandberg 2005	68
7. Reviewer A's Final Categorization of the Participant Responses	102
8. Reviewer B's Final Categorization of the Participant Responses	104
9. Summary of Contributions to the Academic Literature.....	151

LIST OF FIGURES

Figure	Page
1. Perceptions of Teaching and Learning adapted from Trigwell et al. 1999.....	50
2. Origin of Phenomenography.....	53
3. Ethnicity of Phase One Participants.....	84
4. Certification Levels of Phase One Participants	86
5. Desired Grade Level Placement of Phase One Participants	88
6. Travel Experiences of Phase One Participants	90
7. Ethnicity of Phase Two Participants.....	108
8. Certification Levels of Phase Two Participants.....	110
9. Desired Grade Level Placement of Phase Two Participants.....	112
10. Travel Experiences of Phase Two Participants.....	114
11. Frequencies of Select Phase Two Responses.....	117
12. Conceptions of Geography	120
13. Summary of Conceptions of Learning Geography	125

ABSTRACT

A PHENOMENOGRAPHIC ANALYSIS OF ELEMENTARY TEACHER CANDIDATE'S CONCEPTIONS OF GEOGRAPHY

by

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A phenomenographic analysis of elementary teacher candidates attending a large university in north Texas was conducted during the Spring and Fall of 2007. The research study was conducted in two phases with a total of 150 participants. Analysis of the data sought to describe the diversity of conceptions of geography as well as the diversity of conceptions of learning geography held by this participant group. Three conceptions of geography emerged from the data analysis. Two of the three conceptions represent a surface (or shallow) conception of geography and one conception was interpreted to be relational in nature. Four conceptions of learning of geography were found. One of these conceptions of learning geography represents the highest level of phenomenographic categorization; "growing or changing as a person or teacher." Overall

the data suggests that the participants of the study have a more advanced understanding of pedagogy than of the content of geography. This apparent disconnect between the conceptions of the content of a subject and the conceptions of learning that subject has not been previously reported in the academic literature.

CHAPTER 1

INTRODUCTION

“What geographers are researching and teaching at a particular time may be of great interest to them and their professional colleagues, but may not be essential to a sound geographic program in the elementary and secondary grade levels.”¹

Clyde F. Kohn

Academic research generated since the late 1980’s is replete with studies demonstrating that university students differ in their conceptions of knowledge and learning (Entwistle and Entwistle 1992). Additionally, studies show that these conceptions profoundly influence how students approach their learning tasks (Burnett et al. 2003). It has long been suggested that the lack of congruence between the conceptions of learning of university teachers and their students is causative with respect to some learning difficulties (Perry 1970). This is particularly problematic as students view knowledge as absolutist and authority-based, while their teachers stressed ambiguity and conflicting truths (Burnett et al. 2003; Dahlin 1999; Schommer 1993; Schommer et al. 1992; Stonewater et al. 1986). In this study, I conducted a phenomenographic analysis of elementary teacher candidates’ (ETCs) conceptions of geography and their conceptions of learning geography. This study is viewed as baseline in nature, hopefully providing a

¹ In an address by the Past President of the AAG, Clyde F. Kohn: "The 1960s: A Decade of Progress in Geographical Research and Instruction," *Annals* 60 (1970): 211-219. Professor Kohn as served as the president of the NCGE.

solid foundation on which future research that is correlational, or causal can be situated. Phenomenography, as a qualitative research method, has a genesis that is pragmatic and empirical. Researchers such as Marton and Saljo were interested in answering the question of why some students in a class do better than others in that same class (1976). There may be many hypothesized reasons for this, however they inferred that there might be a connection involving what the student conceives the content as and how the student conceives of learning that content. Based on these conceptions, a student then adopts a surface or deep approach to learning that content.

The study of conceptions of learning has a considerable research base, much of which is directed toward the identification and categorization of the conceptions held by university students. Marton and Saljo identified contrasting deep and surface conceptions of learning where students' efforts were directed toward meaning construction, or memorization of details, respectively (1976). Further research has led to the establishment of relationships among student understanding, approaches to learning, and conceptions of the learning task. Burnett et al. in their investigation of the mediating effects of learner self-concept, support the positions of Marton and Saljo whose research established an important link between the level of understanding reached and the level of processing adopted, with the approach to learning being a function of the student's conceptions of the learning task (2003).

Marton et al. identified a hierarchical framework consisting of six levels that represent a sequence of stages leading from surface to deep approaches to learning (1993). Marton's framework will be described further in the literature review of this study. Biggs has suggested two perspectives, learning as quantitative and qualitative; the

former is associated with the acquisition and accumulation of content, and the later is concerned with understanding and meaning-making (1994). Research also points a relationship between students' conceptions of learning and the quality of learning outcomes (Dart 1998; Prosser and Millar 1989; Prosser and Trigwell 1999; Trigwell and Prosser 1991; Van Rossum and Schenk 1984). Studies have also shown that students' conceptions of learning correlate with qualitatively different views of learning that are connected to ways of thinking and acting that differ and include the adoption of strategies of study that differ accordingly (Burnett et al. 2003). In summary, research that focuses on conceptions of learning provides a powerful model for investigation of the university learner whose conceptions of the learning environment, as well as, the expected tasks of learning the content in that environment, greatly influence the approach that the learner brings to bear on those tasks. Thus the learner's conceptions may ultimately determine the level of success or failure achieved by the student in a given course.

Although research of this nature has provided insight into the improvement of student learning in a number of areas of the university curriculum, including accounting, mathematics, physics, and reading education, no studies of the nature described here have been conducted in geography. Additionally, there are no research studies that examine the experience of geography among elementary teacher candidates, as an education generalist. Given their critical role in facilitating the development of conceptual knowledge structures among children, understanding the conceptions of geography and the conceptions of learning geography held by ETCs is significant in nature and worthy of study. Therefore the potential benefits for a conceptions of geography and conceptions of learning geography study among a population of ETCs are significant with possible

curricular, instructional, and educational policy implications that are described later in this study.

The ontological basis for the proposed research extends from four bodies of knowledge including: (1) the conceptions of geography as an academic discipline; (2) the model of the teacher as a curricular-instructional gatekeeper; (3) the lack of attention paid to ETC conceptions in previous models of teacher preparation; and (4) the epistemology of phenomenography as a methodology used in studies of education of a qualitative nature. These issues, as well as a description of the specific application of conceptions research and its associated methodology of phenomenography, should provide further insight into the potential benefits to the learning of geography that is directed toward the achievement of meaningful learning outcomes. In the context of this research, learning geography is the phenomenon under investigation. Specifically the framework question for this research study is, “What are elementary teacher candidates’ conceptions of geography and conceptions of learning geography?”

Statement of Purpose

Given that practicing elementary teachers may differ in their conceptions of geography and the learning of geography and those conceptions may profoundly affect their curricular and instructional decision making as inservice teachers, the purpose of this study was to categorize the diversity of the conceptions of geography held by a sample of elementary teacher candidates. Additionally, this research also proposes to reveal the diversity of conceptions that ETCs have of the learning of geography. This study is expected to establish a baseline of data on which to build additional research that will inform future studies that are more relational or causal in nature.

Statement of the Research Questions

The research questions for this study consist of an overarching framework question along with a series of subset questions to gather responses on elementary teacher candidates' conceptions of geography. The framework question and subset questions will be revisited and discussed in the findings and conclusion chapters of this study.

Framework question:

- What are elementary teacher candidates' conceptions of geography and conceptions of learning geography?

Subset questions:

- What is the diversity of categorization of elementary teacher candidates' conceptions of geography?
- What is the diversity of categorization of ETCs conceptions of learning geography?
- Do elementary teacher candidates' conceptions of geography reflect a deep or shallow understanding of core ideas and content?
- Do elementary teacher candidates' conceptions of geography suggest the ability to teach their students to use geography as an analytic framework for understanding the people, places, and environments of Earth?

Definitions of Terms

This study derives its practical and theoretical legitimacy through the convergence of four themes including: (1) cognitive psychology; (2) conceptions of learning theory and Phenomenography; (3) preservice teacher education; (4) and the academic content of geography as perceived by the professional geography education community. Many

specialized educational concepts are examined within these four themes. To provide a common framework for the use of these terms, definitions are provided as follows:

Elementary Teacher Candidates: (ETCs). These are upper division university students who are enrolled in a teacher education program which prepares them to become teachers in grades Kindergarten through Eighth. Also for the purpose of this study, ETCs are completing their classroom internships and methods coursework and in their final two semesters before graduation. The term ETC was selected because it is consistent with the language of the Professional Development School model in which students gain classroom teaching experience during their university teacher education coursework. It is also the term adopted for use by the National Council for the Accreditation of Colleges of Teacher Education (NCATE).

Future learners: This group is identified as the future elementary students of the teacher candidates participating in this study as they function as inservice teachers after graduation and certification.

Diverse learners: These students are also referred to as academically diverse learners. This term refers to students who differ in their readiness to learn, personal experiences, styles of learning, and life circumstances. It is often assumed that these students are the same age or grade level (Tomlinson 1999a).

Preservice teachers: The term often encountered in the literature used to describe university students preparing to become classroom teachers. This term may refer to students preparing to teach at the elementary, middle, or high school level. A more generic reference than that of elementary teacher candidate and commonly used in the geography education literature.

Student (Students): This group includes university students including ETCs when they function as university students or learners. For example ETCs must function as students in the methods courses they take, as well as student teachers when they intern in the elementary classroom. This term does not refer to children enrolled in K-8 education programs as these individuals are called future learners.

Generalist: This term identifies an elementary teacher who is certified to teach all four subjects including English/Language Arts, Mathematics, Science, and Social Studies in grades Kindergarten to Fourth.

Professional Development School: (PDS). Professional development schools are innovative institutions formed through partnerships between professional education programs and Early Childhood (EC)–12 schools. PDS partnerships have a four-fold mission: the preparation of new teachers; faculty development; inquiry directed at the improvement of practice; and enhanced student achievement. Professional Development Schools are envisioned to improve both the quality of teaching and student learning (NCATE 2008).

Bloom's Taxonomy of Educational Objectives: (Bloom's). This construct consists of a hierarchy of cognitive objectives of learning that proceeds from rote memorization to complex thinking such as synthesis and application of knowledge (Bloom and Krathwohl 1989).

Phenomenography: “The empirical study of the differing ways in which people experience, perceive, apprehend, understand, and conceptualize various phenomena and aspects of the world around us” (Marton and Booth 1997, 111).

Geographic Education National Implementation Project: (GENIP). This organization functions as a clearinghouse in order to coordinate the geography education initiatives of its member associations. Its mission is outreach to educators on behalf of geography and policy makers across the United States. It is active in providing expertise and leadership in the development of policies related to geography education. Its primary focus has been the promotion of standards-based geography instruction as an integral part of every student's educational experience (GENIP 2008).

No Child Left Behind Act of 2001: (NCLB). This legislation is also known as the Elementary and Secondary Education Act of 2001. An act of the U.S. Congress designed to close the achievement gap in public elementary and secondary education with accountability, flexibility, and choice, so that no child is left behind. Knowledge of geography is required by this act (NCLB 2001).

Conceptions of Learning: This definition of learning is based in cognitive psychology where the focus is on the acquisition of knowledge and knowledge structures rather than on behavior (Greeno 1980). Emphasis is on a discrete change between states of knowledge rather than on change in the probability of response. Learning is rooted in cognitive process, hence behavior is the result of learning rather than what is learned (Stevenson 1983).

Surface (Shallow): This term refers to a conception of learning such as simply increasing one's knowledge or memorizing. The learner does not engage in the process of meaning making or transformation with respect to his/her prior knowledge. The term has also been defined as memorization without the intention to understand.

Deep: A term that refers to a conception of learning where the student engages in a meaning making or transformative process. Understanding emerges from a transformation of information in relation to the prior knowledge of the learner. This conception embodies active learning with personal construction of meaning on the part of the learner.

Purposeful Sampling: This is a form of non-random sampling of a segment of a population that is known to have information of interest. Purposeful sampling may be alternately referred to as theoretical sampling.

Constructivism: This theory of learning views learning as the result of an intentional process on the part of the learner to make sense of a concept for them. Meaning must be constructed and reconstructed by the learner as opposed to being handed “already sense-made” knowledge.

Expository Teaching: This approach to instruction is teacher-centered in that during the class meetings, the teacher presents information and the student passively listen’s.

Potential Policy Implications

Phenomenography and conceptions of learning research have emerged as valuable tools in providing information about the qualitative variation in how students experience teaching, learning, and meaning of concepts. It has helped to provide a link between how varied approaches of students to learning are directly related to types of learning outcomes. Studies of the nature described here have already led to improved understanding and resulted in reforms in a number of content-based areas including reading, biology, literature, mathematics, physics, and engineering (Cos Dabiri 2004; Crawford et al. 1998; Koballa et al. 2000; Mann 2000; Marshall et al. 1999; Minasian-

Batamian et al. 2006; Prosser et al. 1996; Tsai 2004). In these studies the phenomenographic analysis often served as a baseline that informed future study. For example in a study of physics education, phenomenographic analysis revealed a shallow conception among teachers about the concept of electromagnetism and was used as a baseline on which additional studies were conducted (Prosser et al. 1996). This led to the design of curriculum that proved to be effective in deepening these students understanding of the phenomenon and their efficacy as teachers.

This research should provide useful information that leads to improvement in teacher education in geography for ETCs. The ultimate contribution that this research will make is to that of the ETC's future learners. By knowing what conceptions ETCs hold, modifications may be incorporated within the teacher education curriculum to better equip them to teach geography in an effective and meaningful way to their future learners. Additionally, this research will inform professional development for inservice teachers whose teaching is likely to be influenced by the shallow conceptions they may have held as ETCs (Martin 2000). An assumption made in this study is that ETCs, by holding shallow conceptions of geography and conceptions of learning geography, serve to perpetuate a cycle of learning *absent of deep understanding* as they "pass on" these conceptions (and misconceptions) to their future learners.

Scope

Given its qualitative approach and use of phenomenographic analysis, the results of this study are restricted to the development and discussion of the phenomenographic "outcome space" for the conceptions of geography and the conceptions of learning geography for a select sample of ETCs attending a university in north Texas.

Additionally, discussions of this study will also include the investigators experience using the method of phenomenographic analysis. There are two justifications for this position. First, phenomenographic analysis requires deep focus, is exhaustive, and time consuming. It requires the researcher to practice “bracketed” deliberation. Bracketing is defined as setting aside one’s own beliefs for a period of time so that one can hear and see as undisturbed as possible. Bracketing involves thoroughly examining and then suspending one's beliefs so that a description about the phenomenon is not contaminated with the researcher's bias. Thus the researcher must work hard to try to eliminate preconceived ideas and notions so that the true conceptions of the participants are reported. Unlike other methods, *a priori* lists (even tentative ones) of conceptions are not established in the research literature. Its position in the literature of higher education is that of a foundation or baseline for subsequent research (Richardson 1999). Secondly, attention to ultimate causality would be inconsistent with the philosophical position adopted for this research study. In the identification of these conceptions and subsequent discussion of them, this study assumes a constructivist (and post-causal) perspective. Fundamental to the constructivist philosophy is the acceptance of learner variance or student academic diversity (Vygotsky 1978). Modern curricular and instructional policy in K-12 is based on the reality that individuals even in a given category differ greatly. The sources of learner variance are multiple and complex and are derived from a layered web of biology, personal, and educational experience. No longer do the institutions of learning focus on the putative causes of academic diversity. Tomlinson captures many aspects of learner variance in the K-12 setting’s acceptance of learner variance by

recommending that educators reframe the questions they ask to include (Tomlinson 1999):

- a focus on needs and interests rather than labels, strengths rather than deficits;
- maximizing access to rich curriculum and instruction rather than remediation;
- tapping into the motivation already within the learner rather than attempting to externally motivate; and,
- creating circumstances that maximize the learner's full possibilities rather than discussions of setting.

The existence of learner variance and its characterization is acknowledged in constructivist thinking, however, the focus in this study will be on movement forward within the subject matter content. The putative causes of learner variance are often judged too complex to be addressed as a classroom teaching concern. Constructivism embraces a “take what is before you now” perspective in its approach to education, that is a constructivist teacher would accept learner variance as a given and, upon assessment of prior understanding, would attempt to “craft curricular circumstances that leads to student success” (Tomlinson and McTighe 2006, 18). Thus, addressing the ultimate causes of diversity of conceptions, revealed by data analysis, will not be included in the scope of this study. However, in support of this position, specific literature about learner variance and constructivist thinking will be reviewed in Chapter Two.

The data collected in this study, and any interpretation of them, are valid only as they represent the conceptions of learning of geography of the sampled population and the author's analysis and interpretation of them. A purposeful sampling of elementary teacher candidates was utilized to gather data about this population's specific conceptions

of geography, a subject they will be expected to teach effectively in their professional work-life in education.

Summary

In this introduction, a research study based in the theory of conceptions of learning and its widely associated methodology phenomenography is described. The proximate intent of the study was to deepen the background knowledge we have about the conceptions that a sample of ETCs have of geography by providing a baseline of knowledge. The ultimate intent of the study is to describe the diversity of conceptions of geography and the diversity of conceptions of learning geography that are held by a sample of ETCs. It is hoped that the results will provide foundation for further studies based on authentic data rather than assumptions. Phenomenographic analysis, given its ability to reveal the diversity of conceptions held by a sample of participants, was seen as the appropriate methodology. These purposes are supported by the research literature that contends that there is a relationship between teachers' conception of learning the content of a discipline and their students' conception of the same. Based on their conceptions, students adopt either a surface approach to learning the material or a deep approach to learning the material depending on the perceived intent of the teacher by the student. Revealing the diversity of conceptions of geography held by these ETCs is the first step in developing strategies that promote deep learning approaches for both these developing teachers and their future learners. To my knowledge, the conceptions of geography and the conceptions of learning geography has not been studied within a population of ETCs. Given the role of the elementary generalist, who is certified to teach all subject

disciplines, an understanding of the conceptions held by them is certainly worthy of research that will inform curricular and instructional improvement and future efforts at reforming the content preparation of ETCs.

CHAPTER 2

REVIEW OF THE LITERATURE

“Theories are nets to catch what we call the world; to rationalize, to explain, and to master it. We endeavor to make the mesh ever finer and finer.”

(Popper 1968, 49)

2.1 Introduction

The twofold purposes of this chapter are to review relevant aspects of the academic literature related to Elementary Teacher Candidates (ETCs) conceptions of geography and the learning of geography and to provide an epistemological framework for the choice of phenomenography as the research strategy used in the study. ETCs were chosen as the participants in this study because of their unique potential to significantly affect the perception and understanding of important concepts in young children.

Elementary teachers, as the curricular-instructional gatekeeper in their classroom, help to set lifelong conceptions of both the learning process and the nature of content knowledge. There are five sections that describe knowledge relevant to the objectives of this study.

The sections include:

1. Standards-based geography;
2. The teacher as the curricular-instructional gatekeeper;
3. Preservice geography teacher education;
4. Approaches to the understanding of learning; and,
5. Conceptions of learning and phenomenography.

2.1.1 Standards-based Geography

In the section on Standards-based Geography, select aspects of the standards movement in the United States are reviewed as applied to the teaching and learning of geography. Scant attention has been directed toward the beliefs and understandings that ETCs hold regarding geography. Worth repeating is a warning that a lack of attention paid to teachers thinking can lead to flawed assumptions on the part of curricular and instructional designers. This section concludes with literature that cites the problematic nature of trying to influence state prescribed teacher education programs and literature that bemoans the lack of conceptual depth in geography among ETCs.

2.1.2 Teacher as the Curricular-Instructional Gatekeeper

Literature from general education is presented that positions classroom teachers as curricular-instructional gatekeepers. Studies have demonstrated that the teacher is the most influential component in education, yet at the same time, studies show that the content knowledge and conceptual understandings of elementary teachers is often inadequate. The divergent viewpoint toward the content of a discipline for K-12 teachers as compared to those of university faculty is described.

2.1.3 Preservice Geography Teacher Education

Academic literature specific to preservice geography teacher education is reviewed in this section. Academic research in related disciplines such as science and mathematics regarding teacher content knowledge and content specific pedagogy has been correlated to improved student learning outcomes and will be reviewed as well.

2.1.4 Approaches to the Understanding of Learning

Academic literature is reviewed about research into how humans learn. Major theoretical approaches are investigated that have proposed how humans learn and how to

utilize the knowledge of cognitive psychology to improve student learning outcomes and the preparation of K-12 teachers. Literature supporting the constructivist perspective is emphasized due to its compatibility with research in the area of concept learning. Select cognitivist literature is also included. The section closes with criticisms of cognitivist thinking and the recommendation for a different theoretical construct better suited to the aims of this study.

2.1.5 Conceptions of Learning and Phenomenography

This section provides a detailed review of the use of phenomenographic analysis in the study of learning conceptions. Despite the recommendations of Keith Trigwell, phenomenography has had little use in geographic education research (2006). It is argued that knowledge of ETCs conceptions of geography and conceptions of learning geography could provide valuable information of a curricular and instructional nature in designing teacher education programs.

2.2 Standards-based Geography

School geography, like many other disciplines, was the subject of major curricular movements leading to the development of a set of standards and organizational frameworks over the previous three decades (Marran 2001). Two of these movements, referred to as the “Five Themes of Geography” and “Geography for Life” respectively, were the result of major cohesive efforts on the part of the professional geo-education community (Bednarz 2002; Bednarz 2003). However, it is important to keep in mind Munby’s admonition about the lack of attention paid to teachers’ thinking in curricular and instructional design, and the potential for its basis on flawed assumptions (1982). A review of the geo-education literature clearly shows that scant attention has been given to

the content of teachers' thinking, specifically, their beliefs and principles. Because of this, the inferences made are likely flawed by erroneous assumptions, especially by the assumption that K-12 teachers and geography researchers, along with geo-education professionals share the same conceptions of geography and geography learning.

A review of the history of geography education that focused on the latter half of the twentieth century would reveal a discipline making tremendous efforts to respond to the standards movement that dominated K-12 education during this period (Petersen et al. 1994). These movements were responses to students' poor performance on national and state assessments of geography content and skills knowledge (Howarth and Mountain 2004). The professional geography education community, through the leadership of organizations such as the National Council for Geographic Education, and the Association of American Geographers, along with substantial resources provided by the National Geographic Society, responded to the standards movement with major initiatives in both the 1980s and the 1990s (Gandy and Kruger 2004). These standards initiatives then served as a foundation for the drafting of K-12 education standards in geography and social studies for a number of states during this same period.

Petersen et al. discuss the noteworthy progress made in geographic education in the ten years succeeding the introduction of, *The Guidelines of Geographic Education: Elementary and Secondary Schools*. Described as durable, having value and utility, the *Guidelines* and its foundation of the Five Themes, provided teachers of geography with the tools they needed to approach geography as an integrative discipline that is integral in the revision of the social studies curriculum (Petersen et al. 1994). Petersen et al. also argue that improvements in the quality and quantity of geography teaching materials that

resulted from the publication of the *Guidelines* should be of great value to teachers as they attempt to improve their students' knowledge (1994).

Boehm et al. described the lack of effective preservice teacher education in geography as a serious failure on the part of the geographic education community (1994). The challenge associated with attempting to reform preservice teacher education is admittedly difficult, however Boehm et al. argue for the need for effective communication among the relevant constituencies as critical to improving preservice teacher education in geography (1994). Citing this challenge as “enormous”, Boehm et al provide a list of twelve specific recommendations that target aspects of preservice teacher education (1994).

Citing the slow rate of adoption of *Geography for Life* standards, Hume and Boehm note that confusion exists over the putative content of K-12 geography and grade level appropriateness (2001). Responding to the slow incorporation of the *Geography for Life* standards, Hume and Boehm describe the development of a geography scope and sequence for grades K-12 (2001). Boehm elaborates on the development of a scope and sequence for geography, along with its supporting guide for educators, as an aid to teachers and other interested constituencies to develop standards-based lessons (Boehm 2002). Additionally, Boehm argues that the development of a scope and sequence for geography should be followed with the development of national and state assessment programs using the scope and sequence as a guide (2002).

In their 2004 article in the journal *The Social Studies*, Rutherford and Boehm make recommendations to social studies standards writers about revisions to existing standards (2004). Rutherford and Boehm propose a total of seven comprehensive

recommendations, one of which targets the professional development needs of K-12 teachers (2004). Additionally, Rutherford and Boehm recommend that standards writers “should arrange for the preparation of correlation guides between core subjects and prevailing framework models in the social studies” (2004, 234).

In their summary of the future of geography education, Bednarz et al. describe the state of preservice teacher education “woefully weak and largely inaccessible” (2004, 176). Further these authors decry the state of geography education as lacking in the theoretical foundation necessary for effective curricular development. Despite a number of curricular movements over the latter half of the previous century aimed at K-12 education, the nature of geography, as well as, the extent of its domain among researchers and practitioners remains a matter of ongoing discussion (Shelley 1999).

2.3 The Teacher as the Curricular-Instructional Gatekeeper

Stephen Thornton describes the K-12 classroom teacher as the, “curricular-instructional gatekeeper” (Thornton 1991, 239). Ultimately, the teachers in their classroom are the final arbiter of what strategies, methods, and content will be utilized and delivered in their day-to-day teaching. Extending this argument to the study described here means that if the conceptions of geography that are held by the professional geography community are to actually reach classroom level practice, then attention to ETC conceptions of geography learning is critical. The literature is replete with studies that demonstrate the teacher as the most influential factor of the educational environment (Clandinin and Connelly 1992; Clayton 2007; McCutcheon 1988; Zeichner 2005). As described above, content knowledge is the central concern of policy makers and accrediting agencies, yet, there is little consensus regarding the extent of content

knowledge needed by elementary practitioners (Thornton 2001). Teachers in an elementary setting are generally certified to teach all subject matter domains across the curriculum but may only have a rather scant and incoherent knowledge of the varied social studies domains including geography (Thornton and Wenger 1990). The social studies content knowledge of one teacher may bear little in common with another elementary teacher and is probably dominated largely by knowledge of several genres of subject matter including history, economics, and civics. Thornton also argues that university social studies departments generally see their role as content experts on the cutting edge of their discipline, and thus this may hold little relevance to the standards-based elementary social studies curriculum that is actually being used in schools (2001). These concerns further establish the need for studies about what conceptions of geography are held by ETCs as they complete their teacher training and prepare to serve as the curricular-instructional gatekeepers in their own classrooms.

2.4 Geography Teacher Education for ETCs

The Geographic Education National Implementation Project (GENIP) has recently released a position statement that defines the, “Highly Qualified K-12 Geography Teacher” (GENIP 2008). As a product of GENIP, this position statement and its concomitant definition of geography teacher qualifications has the explicit endorsement of the Association of American Geographers (AAG), the American Geographical Society (AGS), the National Council for Geographic Education (NCGE) and the National Geographic Society (NGS) (AAG 2008; AGS 2008; NCGE 2008; NGS 2008). The GENIP definition mirrors the definition previously established by the “No Child Left Behind Act” (NCLB) for a highly qualified teacher in every K-12 classroom.

The GENIP position statement “endorses [NCLB] and states that every K-12 student in the United States who studies geography deserves a highly qualified teacher who is well prepared in the discipline: a teacher who recognizes that geography offers a powerful analytic framework for students to understand the people, places, and environments on Earth and connections to the students’ own lives” (NCGE 2008; NCLB 2008).

In its translation to specific course requirements, the GENIP definition of highly qualified would mean that each Early Childhood-4 elementary teacher candidate would have been required to complete a minimum of three content courses. These content courses would introduce Earth’s physical and human systems (NCGE 2006). The GENIP and NCLB definitions hold *content knowledge* as the most important component of teacher preparation and endorse what has been suggested by many geography educators since the 1980s (Boehm et al. 1994; Gregg 1994; Libbee and Stoltman 1989; Ludwig 1995).

Critical concern about the content preparation of elementary teacher candidates is not unique to geography or even to the social sciences in general. Similar movements, along with the attendant emphasis on subject matter knowledge, may also be found in the literature of mathematics education and science education. Both the memberships of the National Science Teachers Association and the National Council for Teachers of Mathematics have endorsed statements about the primacy of content preparation of elementary teacher candidates in order to be considered highly qualified in science and mathematics instruction (NCTM 2006; NSTA 2006).

The depth and scope of geography subject matter knowledge among ETCs and in-service teachers has been at the forefront of the dialogue in geography education.

Boehm's statement, "if all we do is provide inservice training in geography for teachers then we institutionalize the continual need for further inservice teacher training in geography!," is often quoted in the reform literature as a succinct statement of affairs in preservice geography education (Boehm et al. 1995). Studies of the scope and depth of subject matter or content knowledge of teachers has shown to be a significant determinant of teaching success in many domains including science, mathematics, and reading (Ackerson et al. 2005; Leinhardt and Smith 1985; Loughland et al. 2002; Lucas 2001; Prosser 1994).

Concomitant with the importance of content knowledge, studies also show that teachers' pedagogic practices are adoptive of their own experience as students (Gregg 2001; Gregg et al. 1995). One wonders about the nature of a teacher's prior experiences with geography as a student, given the paucity of geographic education in K-12 schools in the past fifty years (Macken 2003; Natoli 1994). Gregg's study of the geography content knowledge among elementary teacher candidates reveals a lack of breadth, depth, complexity, and integration (2001). Further, she concluded that the elementary teacher candidates observed in the study "certainly had not acquired the ability to think geographically" (Gregg 2001). Gilsbach in his assessment of the inadequacies of preservice geography teacher education reminds us that elementary teacher candidates must receive training in geography teaching methods in order to be able to teach effectively (1997). A number of recommendations for improving preservice geography education have surfaced in the literature (Bednarz et al. 2004; Bednarz and Bednarz 1995). Two major policy initiatives, Guidelines for Geographic Education and Geography for Life: National Geography Standards served as focal points to promote

discussion and elicit calls for reform among members of the professional geography education community (Blackwell 1995; Boehm et al. 1994; Petersen et al. 1994; Salter 1990).

A review of the literature reveals a number of suggestions and recommendations about how best to train future K-12 geoeducators. Articles have recommended collaboration between elementary teacher candidates and professional geographers, as well as, collaboration between instructional methods faculty and geography faculty (Bednarz et al. 2005; Ludwig 1995; Petry 1995). Other articles have recommended programs that offer preservice and inservice teachers opportunities to turn geographic theory into practice (Bednarz et al. 2004). Further there are recommendations for the teaching of effective pedagogic practice, the integration of standards, themes and concepts in geography and the use of programs that utilize team teaching, mentorships and interdisciplinary approaches (Ackerson et al. 2005; Bednarz and Bednarz 1995; Blackwell 1995; Boehm et al. 1995; Cole 1995; Doering et al. 1995; Gregg et al. 1995; Hardwick 1995; Hermann 1995; Morrill et al. 1995; Salter 1990).

The literature also provides recommendations for more research into geographic learning, as well as, suggestions about how geoeducators may be involved in the process to reform teacher certification requirements at the national and state levels (Bednarz et al. 2004; Downs 1994; Downs and Liben 1991; Libbee 1995; Libbee and Stoltman 1989). Trigwell in his review of the phenomenographic analysis of geological mapping conducted by McCracken, suggests phenomenography as a potentially valuable research methodology for geoeducators (McCracken 2002; Trigwell 2006). A study of undergraduate geography majors' understandings of learning and teaching was conducted

by Bradbeer et al. and Loughland et al. using phenomenographic methodology to study children's conceptions of the environment (2004; 2002). Largely absent from this literature are research studies of the conceptions of geography held by elementary teacher candidates. Studies of assessment of subject matter knowledge do exist, however they are concerned with the quantification of geography knowledge rather than the conceptions of geography of the participant. Also absent are studies about geography learning that incorporate perspectives derived from modern educational psychology and learning theory. The incorporation of these perspectives has shown much promise in reform efforts in science education and mathematics education (Crawford et al. 1998; Groves and Pugh 1999; Kyle and Shymansky 1989; Sebastia and Torregrosa 2005).

In summary, the literature of geography education does describe general models of preparation which reflects the importance of content knowledge and the vital need of teacher training, however there has been scant attention paid to the geography conceptions held by ETCs. Thus, identifying the conceptions of geography and the conceptions of learning geography is the central focus of this research study.

2.5 Approaches to the Understanding of Learning

A fundamental focus of this research study is the learning of geography. The study of learning, defined as a permanent change in knowledge or behavior, is very complicated due to its dependence on various factors. A dependency relationship may involve factors such as diversity, the quality of instruction, the student's motivation to learn, the learner's level of engagement, and the learner's developmental readiness (O'Donnell et al. 2007)). It is common knowledge that students in the same class who have arguably received the same instruction (i.e., same environmental conditions) vary in

the quality of their learning outcomes. Why this variance occurs under the same conditions is a component of interest in this study.

The theoretical position that is used to guide this research is that learners differ in their learning outcomes because of differences in the learners conceptions of learning. Teachers may conceive the learning of the content as involving higher order knowledge skills such as synthesis and application, while the learner's conception is that of lower order skills such as rote memorization. Research suggests that how a teacher conceives the process of learning will drive that teacher's choice of instructional methods and strategies (Bruce and Gerber 1995; Bolhuis and Voeten 2004). Most frequently, the teacher's conception of learning is determined by each teacher's experience as a learner in previous coursework (Gregg 2001). That is *we teach like we were taught*. If one believes that knowledge is simply handed down from the expert to the novice, then the teacher will likely employ an expository instructional modality promoting passive receptivity on the part of the learner. The addition of files to a filing cabinet, like adding new facts to your knowledge base, serves as an appropriate metaphor for this approach (Mayer 2003). This viewpoint describes learning as knowledge transfer and involves the transfer of knowledge from the teacher's head to the student's head.

As described earlier, expository teaching encourages a shallow or *surface* conception of learning on the part of the student where knowledge is seen as reproductive, retained only long enough to *reproduce* on an assessment instrument (Richardson 1999). In short, the student perceives learning as something that happens to them. Richardson describes the alternative as *deep level processing* where students are directed to the intentional content of the material at hand (1999). The intent as perceived

by the teacher is for the comprehension of the subject matter and the subsequent ability to think critically on the part of the learner. Mayer illustrates deep level processing using a metaphor of building a model which involves understanding how to fit pieces of information together (2003). This is a view of learning as knowledge construction where, “students actively create their own learning by trying to make sense out of their experiences” (Mayer 2003, 12). In deep level processing, the learner takes an active role in learning for the purpose of understanding with subsequent emphasis on the synthesis, application, and evaluation of knowledge. Thus, learning is something the learner does.

The fundamental question of how humans learn has long been the subject of much discussion and debate. Plato, writing a dialogue between Socrates and student Meno, addressed the concept of learning. Socrates and Meno, although quoted in the context of learning virtue, engage in conversation that has come to be known as “Meno’s Paradox:” How can you search for something when you do not know what it is? Or where it is? You might not recognize it if you were to encounter it (Welborne 1986). Beyond Socrates and Meno, many educators, psychologists, and philosophers have attempted to answer the question of how humans learn. Advances in neurobiology in the last twenty-five years have brought a brain-based perspective to this discussion as well. In the context of this study, the question is refined to: what is an individual’s conception of the content and conceptions of learning the content? In particular, what are the conceptions of geography held by ETCs and what are their conceptions of learning geography. Understanding the general question of how humans learn is critical to this research study as knowledge of a phenomenon is requisite to understanding that phenomenon.

Over the years many different theoretical perspectives have been offered to explain how humans gain knowledge, develop understanding, and apply new learning. The theoretical models, most often described to preservice teachers during their upper division coursework, fall into broad streams of thought to which the preservice teacher is provided limited exposure. Stated succinctly, of numerous models of human learning, relatively few are emphasized in the preservice teacher curriculum (Borich and Tombari 1997). Ormrod suggests five general theoretical approaches to the study of learning as relevant to preservice teachers (2006). Each of these five models is distinguished from one another as to how learning occurs and the role of the teacher and learner. Table 1 adapted from Ormrod (2006), provides a summary of these five theoretical perspectives.

Table 1. Theoretical Approaches to the Study of Learning

Theoretical Perspective	General Description	Example of Prominent Theorists
Behaviorism	Thought processes cannot be directly observed and measured so scientific study of thinking is difficult. However one can observe and measure humans' responses (behaviors) and the environmental events (stimuli) that precede and follow those responses. Learning therefore is the process of acquiring and modifying associations among stimuli and responses.	B. F. Skinner Ivan Pavlov
Social Learning (cognitive) Theory	Focus is on learning that occurs by observing one another. Environmental stimuli can affect behavior, however cognitive processes such as awareness of stimuli and the expectation of future events also play a significant role. Humans learn through modeling however self-efficacy plays a role in how effectively they perform. Humans engage in self-regulation, taking charge and directing their own actions.	Albert Bandura Barry Zimmerman
Information Processing Theory	Focus on the cognitive (thinking) processes involved in learning, memory and performance. Inferences are drawn based on how humans execute tasks and behave in situations. These inferences describe how humans perceive, interpret and process information from the environment. Originally theorists believed that the human brain functioned as a computer and as a result used terms such as encoding, storage, and retrieval to describe thinking.	Richard Atkinson Richard Shiffrin
Sociocultural Theory	Emphasis is on the social, cultural and historical contexts of the learner. In social interactions human children encounter appropriate ways of thinking about and interpreting objects and events. With time these ways of thinking, first used in a social context, are internalized into unspoken mental processes that learners use on their own. This explains why different cultures developed different ways of thinking, learning and teaching.	Jerome Bruner Lev Vygotsky Barbara Rogoff
Constructivism	Focus on internal aspects of learning. Humans create (rather than absorb) knowledge from their observations and experience. Humans combine what they learn into integrated bodies of knowledge (schemas) and beliefs that may or may not be accurate understandings of the world.	Jean Piaget John Bransford John Dewey

Each model has strengths and weaknesses when it is applied to the instructional setting. However, it must be noted that the academic literature in this area is expansive with distinctions between and among models lacking general resolution and agreement. Models of learning often share components as well as overlap with one another further complicating exclusive categorization of competing models. Given that the theoretical perspective of this study is that of teachers as decision makers, in the next section the cognitivist and constructivist models will be described in detail following the organizational schema proposed by Ormrod (2006). However, in order to situate the cognitivist model within this organizational schema, I will begin with a brief description of behaviorism.

2.5.1 Behaviorism

Behavioral process models of human learning dominated much of the discussion about learning in the 20th century. In its simplest form, behavioral models of learning emphasize change in the learner's environment as causal to changes in the learner's observable behavior. Behavioral process models remain appropriate for some aspects of learning in the educational setting such as in classroom management and assessment. Critics of behaviorism cite three areas of concern regarding its usefulness for describing learning (Ormrod 2006). First behavioral theories do not account for free will and do not consider influences such as moods, thoughts, and feelings. Additionally, behaviorism does not account for adapting behavior when new information is introduced even if prior behavioral patterns have been established. Finally, behaviorism does not explain learning that occurs without the use of conditioning.

However, cognitive models of learning have been popular among educational psychologists over the last thirty years. These cognitive models have emphasized the role of thinking processes in interpretations of learning. This research study subscribes to the cognitive interpretation of learning. However, the sharing and overlapping nature of learning theories strongly supports starting with a brief introduction to general subject of educational psychology.

2.5.2 Relevant Educational Psychology

Fetsco and McClure define educational psychology as a, “branch of psychology that is concerned with mental processes and behaviors associated with human learning and instruction” (2005, 2). By asking questions relevant to learning and through the application of scientific methodologies, educational psychologists can suggest theoretical perspectives of epistemic value to teachers and learners. A major theme of this research study sees teachers as curricular/instructional decision makers, thus knowledge of educational psychology can assist the teacher in instructional planning that reflects the attainment of effective learning outcomes for the learner. Such lesson planning should include consideration of characteristics that affect a student’s ability to engage in meaningful learning such as the individual’s prior experiences with the subject matter. Ausabel states that the single most important consideration in lesson planning for effective learning outcomes is the student’s prior knowledge and abilities (1968). Another perspective on instructional benefits offered by knowledge of educational psychology is provided by L. S. Shulman. Shulman describes four knowledge domains important to successful teaching: (1) practical knowledge which comes from the experience of teaching; (2) case knowledge derived from reading about successful and unsuccessful

teaching experiences; (3) theoretical knowledge which comes from reading about relevant ideas, concepts and paradigms of teaching; and (4) empirical knowledge which comes from review of research literature (1992). The inquiry of educational psychology focuses on the later two categories. As mentioned previously, only the domains of cognitivism and constructivism are viewed as epistemic to this research study and therefore the following narrative will be inclusive of only those domains. A limited description of each of these domains follows and subscribes to the taxonomy provided by Driscoll (2004) and Gredler (2001).

2.5.3 Constructivism

Bredo writes that the term *constructivism* appears in the literature of philosophy, sociology and education (2000). Further, these disciplines and the varied schools of thought within them refer to constructivism in diverse ways. Constructivism may also be used to refer to the development of scientific knowledge, the formation of children's knowledge and the relationship between knowledge and reality (Gredler 2001). The term may also be used in an epistemological sense referring to the nature of bodies of knowledge such as the nature of history or the nature of mathematics. In the context of this study, constructivism refers to the context of educational practice, such as the use of a certain strategy or method of instruction to facilitate effective learning outcomes or meaningful learning (Phillips 2000). Matthews cautions us, that not only are there moderate and extreme views of constructivism, there may also exist apparent conflict between one's philosophical stance and the beliefs that one holds about the use of certain educational practices (2000). As evidence, Thomas Kuhn endorsed a constructivist approach to science, but held anti-constructivist views of pedagogy (Matthews 2000). On

the other hand, Phillips, in his review of the literature, describes constructivist classroom practice being justified in ways that are philosophically incompatible (2000).

2.5.4 Social-Constructivist Conceptions

Discussions about the nature of knowledge conducted over the last twenty years generally assume social-constructivist perspectives. By emphasizing the role of social process in the generation of knowledge they either greatly reduce or offset the influence of external reality in the production of knowledge (Phillips 1997). This perspective takes on a critical significance when applied to the disciplines of science and mathematics. Social constructivists argue about the extent to which a science such as physics reflects the reality of the external universe or is a human construction. There are a number of factions among social constructivists who promote conservative to radical views about conceptions of the nature of science. Latour identifies conservative, progressive, and radical conceptions of the social construction of the nature of science (1992). The conservative view argues that science has a reality free of society, but “social factors leak in and influence its development” (Latour 1992, 276). A progressive view argues that social interactions construct knowledge of science in part, however, nature leaks in when conclusions are drawn (Latour 1992). A radical social constructivist view of the nature of science argues that knowledge is constructed wholly from social interactions and that objects do not have an external reality. In this view of nature, objects are constructed by humans as social artifacts during an inquiry process (Latour 1992). Quoting Gredler, an example of this thinking is, “atoms, molecules, and quarks are human constructions...social artifacts...products of social forces, interests and other historical characteristics of the local context” (2001, 17). Although this view of constructivism is

extreme, its inclusion in this discussion is relevant in that the research methodology chosen for this study, phenomenography, argues for a non-dualist view of nature. Phenomenography supports the knowledge claim that object and process are inseparable. For example, one does not think independently of thinking about something. Otherwise stated, one does not think unless they are thinking about something. Further, nondualist perspectives would support the claims that one does not write unless they are writing about something and someone does not go unless they are going somewhere.

2.5.5 Educational Constructivism

Educational constructivism, like the social constructivist conceptions discussed previously, has multiple views and perspectives among individuals in different school subject matters or disciplines. However, the perspective of learners, as active constructors of their own knowledge, is a core belief among constructivists. The term constructivism has been attributed to Piaget's reference to himself as a "constructivist" and Jerome Bruner's use of the term constructionist to describe his conception of discovery learning (Driscoll 2004). Driscoll contrasts constructivist conceptions with those of the objectivist (dualist) epistemology where knowledge is perceived to exist independently of learners, and learning is the transfer of this outside knowledge to within the learner (2004). "The human mind as a computer" metaphor suggests an objectivist perspective where knowledge is interpreted as input to be processed and/or stored by the learner. This objectivist perspective stands in stark contrast to that of the constructivist whose view is that knowledge is constructed by the learner as he attempts to make sense of an experience. Driscoll states that, "Learners, therefore, are not empty vessels waiting to be filled, but rather active organisms seeking meaning. Regardless of what is being learned,

constructive processes operate and learners form, elaborate, and test candidate mental structures until a satisfactory one emerges” (2004, 387). Driscoll further states that new and conflicting experiences are discrepant causing the learner to construct a new in order to make sense of the new information (2004). This means that the learner will stick with a conception as long as it sufficiently explains the reality as they have experienced it so far. For example our everyday experience of the Earth is that it is flat. Nothing about our general day-to-day existence would tell us otherwise. A flat Earth conception works sufficiently in our experience as long we are not expected to think critically about seasonal changes in solar exposure. Trying to understand these changes using a model of the Earth that is flat will result in a discrepancy. Faced with this discrepancy, the learner may have to re-evaluate and possibly discard the unsatisfactory mental construct in favor of the construction of a new and satisfactory construct. Driscoll (2004) argues that the preceding conception bears strong resemblance to Piaget’s schema accommodation concept, and both Bruner and Vygotsky supported similar concepts to explain changes in children’s knowledge with respect to developmental process.

In the context of constructivism, conceptions are understood to be constructed by the learner in order for the learner to make sense of the context and the curriculum. Constructivism is often parsed into the practice of the individual learner and the practice of the learner interacting with other learners in a collaborative environment where negotiation of meaning occurs through social interaction. To distinguish the two, they are referred to as individual constructivism and social constructivism, respectively.

2.5.6 Individual Constructivism

The roots of individual (or personal) constructivism are attributed to Jean Piaget who proposed that learning is an internal process and that essential learning occurs when one's previous thinking is challenged (Driscoll 2004). Personal or individual constructivism's chief spokesperson is Ernst von Glaserfeld. Professor von Glaserfeld's views do conflict with Piaget in that Piaget's cognitive development theory does admit the existence of an external reality, focuses on developmental preparedness, and changes in children's thinking that accommodate changes in understanding reality (1995). Professor von Glaserfeld theorizes a view of learning as the construction of coherent and useful schema (Driver 1995). Additionally, he cites the goal of learning as the shifting of focus from trying to replicate the teacher's words and actions to the students' successful organization of their own experiences (Gredler 2001). For example von Glaserfeld made specific recommendations about approaches to science education in that teachers should develop questions that "shape student's reasoning toward the accepted view of science" (Driver 1995, 397). In summary, individual constructivism is concerned with how individuals create knowledge through their interactions with the environment.

2.5.7 Social Constructivism

Gredler asserts that social constructivists dispute individual constructivist views in three ways (2001). These views are organized in Table 2 and, adopted from Gredler (2001). The first difference lies in the definition of learning. The social constructivist views knowledge as transactional, that is knowledge and the process that produced the knowledge cannot be separated. A second difference is that learning is of social construction. The final difference is that learners share knowledge construction with each

other serving as co-participants in a classroom community (Bredo 1994). For example, a social constructivist view of mathematics would not view it as a body of objective knowledge but rather as a “sequence of evolving mathematical practices in a community of learners” (Gredler 2001, 86). Constructivists do share a focus on the internal dimensions of learning with the cognitivists. Given this shared dimension Table 2 shows a brief and limited discussion of cognitivism is appropriate to the focus of this research.

Table 2. Common Social Constructivist Beliefs adapted from Gredler 2001

Dimension	Shared Belief
Definition of knowledge	Knowledge is the product of the particular environment to which the learner belongs. The product of learning is inseparable from the occasions or activities that produced it.
Definition of learning	Social interaction that constructs and reconstructs contexts, knowledge, and meaning. Socially shared cognition.
Locus of learning	Learning occurs in a community of participants and is distributed among the co-participants. Learning is not confined to the individuals mind.

2.5.8 Sociocultural Theory

Cognitivist beliefs focus on the human brain and the process of thinking. There are a number of theories that fall within the domain of cognitivism however given this study's focus on teacher conceptions only those of Jerome Bruner, Jean Piaget, and Lev Vygotsky are considered relevant to this study. Bruner's approach to learning takes a developmental perspective, and he strongly advocated the consideration of culture as the central focus in curriculum design. Piaget's focus was on the development of reasoning skills from childhood to adulthood (Piaget 1970). Vygotsky's focus was on the influence of the sociocultural milieu on learning (1978). However Piaget's ideas differ from those of Bruner and Vygotsky in that Piaget's studies were organized around a child's developmental readiness where Bruner and Vygotsky saw the role of learning as causative to development (Driscoll 2004).

2.5.9 Bruner and Vygotsky

Theories of cognitive development explained in the context of cultural and social factors emerged in the 1960s. Similar to the thinking of Piaget, Bruner and Vygotsky were interested in possible relationships between development and cognition. Bruner's original research on cognitive development occurred in the context of the United States' massive educational response to the launch of Sputnik and its interpretation by the U.S. as failure on the part of its educational system (Gredler 2001). Bruner argued for the construction of a theory of learning whose principles could be used for the design of instruction that led to effective classroom teaching (1961). Bruner's work helped to shift the focus from describing learning to prescribing instruction (Gredler 2001).

Table 3. Bruner's Stages of Cognitive Development

Stage	Definition
Enactive	Knowledge is represented in terms of action taken on the part of the learner. May lack the ability to describe the action needed.
Iconic	Learner can summarize an object or process visually using a drawing.
Symbolic	Learner can use words to describe an experience or procedure.

Bruner identifies the goals of education as intellectual development and that school curriculum should develop problem solving skills using inquiry and discovery processes. He describes a child's cognitive development in three hierarchical stages organized in Table 3.

According to Bruner, the objects of instruction should respond to the child's enactive, iconic, and symbolic view of the world (Gredler 2001). The curriculum should use the organizing concepts of the subject matter as the basis of its design and that this leads to an intellectually honest approach to teaching any learner at any stage of development (Bruner 1964). Bruner also argued for the use of learning by discovery defined as "obtaining knowledge for oneself by the use of one's own mind" (Bruner 1961, 22). Although not stated explicitly, this statement represents a view of cognition consistent with those of constructivism. Further, Bruner argues that knowledge of one's culture is a critical component of instructional design. In his cultural-historical theory, Vygotsky in a similar vein extended the role of culture in cognition and instruction (1978).

2.5.10 Criticisms of these Approaches

Tenets of constructivist thinking are embedded in Bruner's and Vygotsky's cognitive approaches to understanding of the relationship between development and thinking. This brings forward a question very relevant to this study. This question focuses on the role of social and/or cultural forces in making certain actions or thinking possible for the student. For instance, consider how the question: "how do these forces (socio-cultural) influence the learner's choice between a surface or deep approach to the study of the subject matter?", would be related to the framework of this study. Studies rooted in

these cognitive traditions focus on the interactions that occur in the social and cultural environment of the learner such as the interactions between the learners themselves and their learning environment (Marton and Booth 1997). The epistemological perspective in these studies is that of a learner's "observed world" as it is interpreted by the *researcher*. Marton and Booth argue that this is similar to the views of a behaviorist, where the inner views of the learner are not of concern, because the learning situation is described from the researcher's point of view (1997).

A fundamental assumption in cognitive studies is that of the participants' perceiving situations in the same ways as the researcher (diSessa 1993). Further Vygotsky's cultural-historical perspective tries to explain consciousness in terms of society (Marton and Booth 1997). Restated, the cultural-historical perspective attempts to explain the "inner" (consciousness) in terms of the "outer" society. So it would seem that individuals described as cognitivists such as Bruner and Vygotsky have explanations that extend in opposite directions. Attempts to resolve these apparent contradictions are described in 1994 by Cobb. This is contrasted with the conceptions of learning approach employed in this study where the conceptions of geography and the conceptions of learning geography are interpreted and categorized as the perceived world of the *participant*. In the analysis of phenomenographic data, the researcher attempts to answer the question, "what does this participant's response tell me about how *they* conceive (or experience) the phenomenon under study." In conclusion, the psychology of constructivism with its focus on the learner's active role in acquiring knowledge, serves to help situate this study. Further, despite the problems associated with different

cognitivist thinking, its current interest in culture and people is an important contribution to our understanding of the learning process.

2.6 Learner Variance

An unavoidable reality of education in the United States is the existence of learner variance in classrooms at all levels. C. A. Tomlinson, when asked why differentiation of instruction was necessary, responded: “A simple answer is that students in the elementary grades vary greatly, and if teachers want to maximize their students’ individual potential, they will have to attend to the differences” (1999a, 13). When asked about the most powerful trend affecting colleges, Mark Miliron responded by saying, “The biggest trend is that we’re really swimming in a world of learning swirl,” (2008, 1). These statements represent a small amount of the commentary regarding learner variance that has been reported in the literature. Learner variance is pervasive and has been reported at all levels in K-16.

Learner variance is the result of a complex and overlapping web of many factors including: culture, race, language, economics, gender, experience, motivation to achieve, disability, advanced ability, personal interests, learning preferences, and the presence or absence of an adult support system to name a few (Tomlinson and McTighe 2006, 1). Given the complexity of its origins and causes, learner variance in the classroom is the accepted reality of many teachers, administrators, and curriculum designers who seek to address problems associated with student understanding and knowledge application. Tomlinson and McTighe argue that those in education who pretend learner variance does not matter are illusionary (2006). Further these researchers organize this variation into four general categories: biology, degree of privilege, positioning for learning, and

preferences. They also suggest factors that shape the category and select implications for learning. The following are brief summaries of the four categories (Tomlinson and McTighe 2006).

Variation due to a person's biology is shaped by gender, brain structure, abilities, disabilities, and development. The implications of these factors are that some learning parameters are defined but may change with appropriate context and support. Also linked with biology is that students learn on different timetables and in different modes.

Degree of privilege may be shaped by economic status, race, culture, support system, language, and experience. Implications associated with these factors are that students from low economic background, special populations, or from cultures speaking languages who are not in positions of power often face problems with regard to education. Additionally, the extent of adult support and the breadth and depth of experience is known to influence learning.

An individual's positioning for learning may be shaped by adult role models, trust, self-concept, motivation, emotional temperament, and interpersonal skills. The implications of these factors are that positive interpersonal skills have a positive impact on student learning, as do trust, positive self-concept, positive temperament, and motivation. The presence of adult role models who actively recommend education can positively affect student learning.

An individual student's preferences also shape learning. A learner's preferences are shaped by interests, learning preferences, and his/her preferences for certain types of individuals (teachers). A given student's interests will vary across topics and subjects. Individuals vary in their preferences for how to assimilate and demonstrate knowledge.

Additionally, students relate to teachers differently thus a degree of “fit” exists between them that may positively to negatively affect learning.

In the context of this study, the causes of the diversity of conceptions held by ETCs will be assumed to be the result of a web of complex and overlapping factors whose effects are specific to that individual. The affects of these factors produce an individual milieu far too complex to address in this study. Thus, the causes of the variation or diversity of conceptions of geography and the conceptions of learning geography observed in this study will not be addressed. Concomitantly, an assumption fundamental to phenomenographic analysis is that it reports the diversity or variation of conceptions held by the sample or group and not those of the individuals in the group.

2.7 Conceptions of Learning and Phenomenography

An area of study that has received little attention is that of elementary teacher candidates’ prior conceptions of geography as distinct from their prior knowledge of geography’s identified core concepts and ideas. A conception is described as phenomena dependent on both human activity and the world as it is experienced by the individual (Svensson 1997). Marton et al. describes six conceptions of learning: (1) increasing one’s knowledge; (2) memorizing; (3) applying; (4) understanding; (5) seeing in a different way; and (6) changing as person (1993). They explain the six conceptions as organized in a hierarchical structure. The first three conceptions represent taking in information as if it was “something readymade [and] devoid of meaning” and are correlated with a shallow approach to learning (Marton et al. 1993). The latter three conceptions are associated with deep approaches to learning and view understanding as the relating of new information to relevant knowledge and experience.

Entwistle maintains that conceptions of learning evolve concurrently with knowledge of self so that a student's conception of subject matter will progress from the simple acquisition of ready-made quanta of information to one that encompasses a change in themselves and their world (1997). The potential importance of this study is made clear when one considers that the approach to learning that is employed, the level of processing adopted, and level of understanding reached is a function of the ETCs conceptions of geography.

Initial studies of conceptions of learning were conducted in the 1970s. Saljo conducted interviews of 90 participants with ages ranging from 15 to 73 years representing several educational institutions (1979). His analysis showed that for some participants, learning was perceived as rote memorization and for others it was perceived as "something which can be explicitly talked about and discussed and can be the object of conscious planning and analysis" (Saljo, 1979, 446). In response to the specific question, "what do you actually mean by learning", Saljo parsed the data into five conceptions of learning he interpreted to be qualitatively different (1979). The five categories described by Saljo were: (1) learning as the increase in knowledge; (2) learning as memorizing; (3) learning as the acquisition of facts, procedures, etc., which can be retained and/or utilized in practice; (4) learning as the abstraction of meaning; and (5) learning as an interpretive process aimed at the understanding of reality. (1979, 19). Researchers in the Netherlands and the United Kingdom have confirmed Saljo's conceptions of learning scheme and later research conducted by Marton et al. suggests a sixth conception which they describe as changing as a person (1993). Marton et al further advises that this sixth conception of learning was only demonstrated in students in upper level coursework and had previously

shown Saljo's fifth conception of learning (1993). Other researchers have conducted studies investigating conceptions of learning with different groups of students and in different educational contexts. Table 4 adapted from Tsai shows brief comparisons of how models of learning conceptions have been represented in the literature (2004).

Table 4. Models of Learning Conceptions

Saljo, 1979	Marton et al., 1993	Eklund-Myrskog, 1998	Marshall et al., 1999
Increase of knowledge	Increasing one's knowledge	Remembering	
Memorizing	Memorizing	Understanding	Memorizing
Acquisition of facts, procedures that can be retained and/or utilized in practice	Applying	Applying knowledge	Applying equations and procedures
Abstraction of meaning	Understanding	Getting a new perspective	Making sense of physical concepts and procedures
An interpretation process aimed at the understanding of reality	Seeing something in a different way	Forming a conception of one's own	Seeing a new way
	Changing as a person		A change as a person

A fundamental tenet of research of this nature is that it reveals that participants in the studies conceptualize learning in a limited number of qualitatively different, however related ways. Research conducted by Biggs demonstrated that in-service teachers, who conceptualize learning as the accumulation of information, were more likely to perceive teaching as the transfer of information (1994). Prosser and Trigwell's study showed that teachers who conceive learning as conceptual change were prone to view their role as a teacher as one of facilitating conceptual change (1999). The associations described here are shown diagrammatically in Fig. 1.

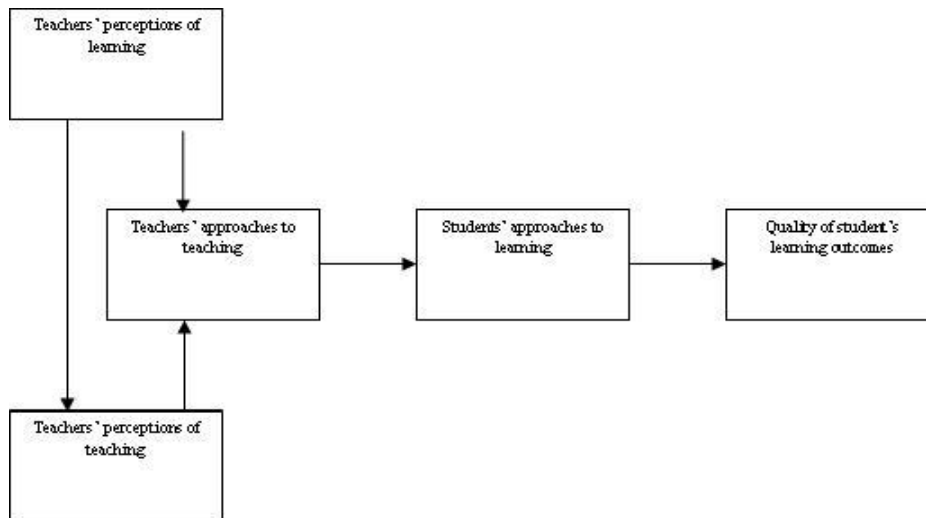


Fig. 1. Perceptions of Teaching and Learning adapted from Trigwell et al. 1999

As Fig. 1 demonstrates, the approach to learning that the student adopts is related to the approach to teaching adopted by the teacher (Trigwell et al. 1999). Students who describe learning using a deep approach are more likely to be taught by teachers who also report using a conceptual change and a more student centric teaching model. Cope (2000) and Marton & Booth (1997) both suggest enhanced learning outcomes are associated with conceptual change and deep understanding. Empirical support for the direct association between a teacher's approach to teaching and the approach subsequently adopted by the students has been demonstrated (Prosser and Trigwell 1999). Further research shows that students using deep learning approaches tend to value learning independence and clear learning goals where students using surface learning approaches do not demonstrate these values (Cope and Ward 2002).

2.8 Phenomenography

Phenomenography, a research tradition that has emerged in studies of higher education over the last 25 years, has been used effectively to identify the qualitative variation in the conceptions of subject matter, yet there is a dearth of published research about the diversity of learning conceptions held by elementary teacher candidates regarding geography (Booth 1992; Boulton-Lewis et al. 2004; Marton 1981; Marton 1988; Prosser and Trigwell 1999; Richardson 1999; Svensson 1997). In phenomenography, learning may be described as what students actually learn instead of a description of the quantity of learning that has or has not occurred. As a research tradition, phenomenography reveals the diversity of learning, making explicit the range, patterns, trends and complexity of student responses, therefore providing a window into the learner's cognitive framework (Boulton-Lewis et al. 2004). Phenomenographic

studies do not consider correctness or understanding, as its focus is to describe the diversity of categories that emerge from open-ended questioning of the participants. Sharma et al. describes phenomenographic analysis as a methodology that extracts emergent patterns from the data rather than seeking evidence of pre-determined patterns (2006).

2.8.1 Phenomenography: An Approach to Research in Education

Bowden defines phenomenography by stating:

“In a sense phenomenographic research mirrors what good teachers do. It tries to understand what the students are doing in their learning. It attempts to discover what different approaches students are taking and to understand these in terms of outcomes of their learning activities. Good teachers do that as a preliminary to further action to help their students come to understand the concept concerned and, of course many do it instinctively” (1990, 9)

As an educational tool, phenomenography’s perspective is non-dualist (relational), qualitative, and second order. It attempts to identify the variation of experience that exists related to some object or phenomenon. The outcome of the analysis is a “limited number of internally related, hierarchical categories of description of the variation” (Trigwell 2006). Phenomenography's differences from other approaches are shown in Fig. 2. Figure 2 provides a graphical definition of phenomenography according to Trigwell (2006).

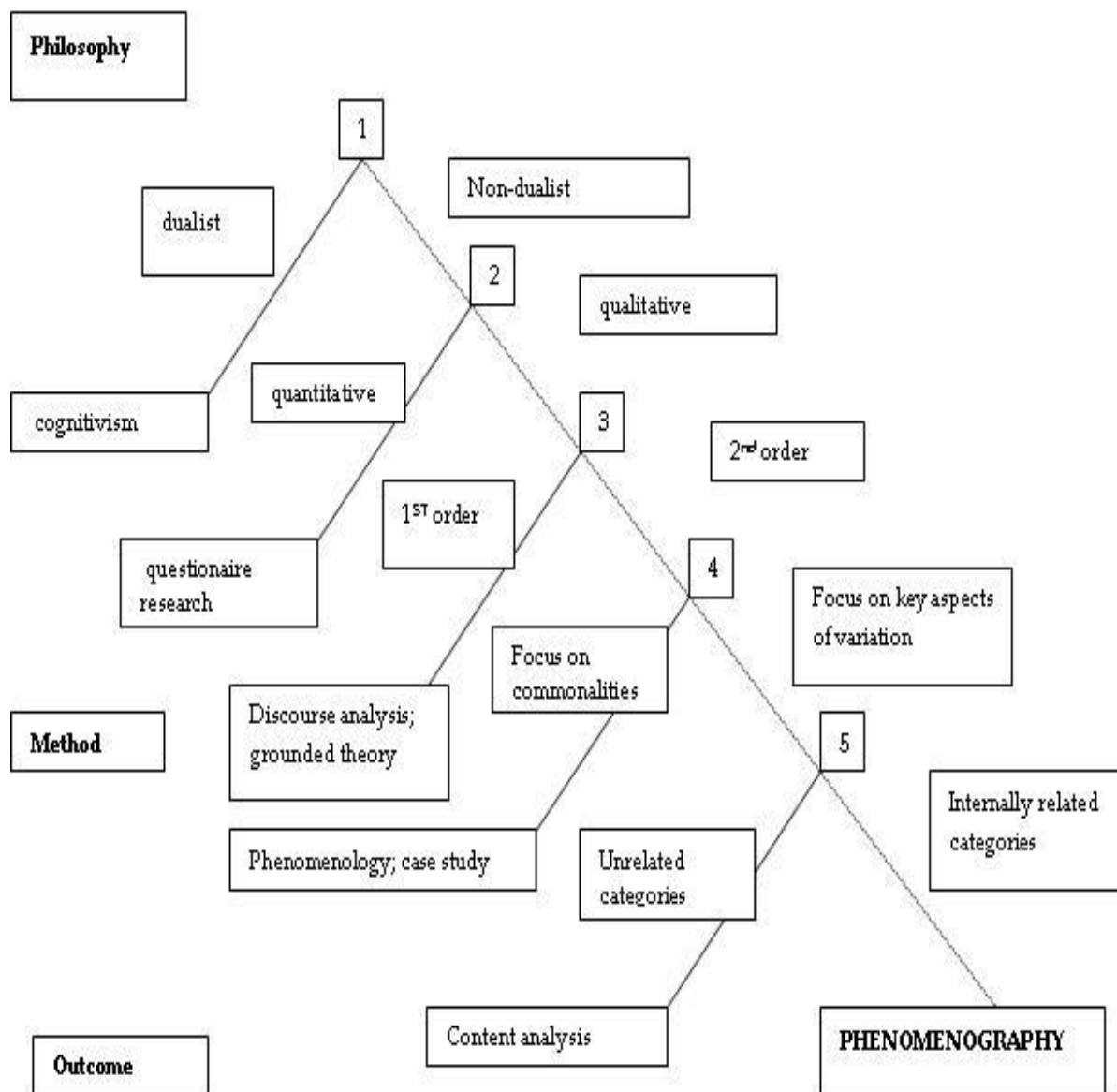


Fig. 2. Origin of Phenomenography

Point 1 shows phenomenography as the right-hand branch; it is non-dualist unlike cognitivism in which person and phenomenon are separate entities. Point 2 shows that phenomenography is qualitative. Point 3 shows the second order (right-hand branch), which is the other's experience of the phenomenon that is described, not the researcher describing the phenomenon as they perceive it (first-order). Point 4 shows that the focus in phenomenography is on the variation of experience of a group. The sample is deliberately selected because the study aims to find a range of experience. Point 5 shows that phenomenography attempts to explain the internal relationships between the diversity of categories of the conceptions.

There are two other well known knowledge claims that are used to analyze qualitative data namely Grounded Theory and Phenomenology (Creswell 2003). Each tradition has experienced diverse application in qualitative research. Grounded Theory is often used to generate theory from the data that is gathered while Phenomenology is often employed when there is need to study the participants' understanding of some phenomena. Grounded Theory approaches tend to consider multiple views of the data from multiple sources while phenomenological analysis leads to an identification of themes and a structure for each theme (Creswell 1998; 2003). In contrast to Grounded Theory and Phenomenology, phenomenographic analysis is comparative, may involve multiple researchers, and uses multiple iterations of sorting and resorting to examine participant responses in search of emergent categories and diversity (Akerlind 2005). The professional literature in higher education, mathematics, science, clinical medicine, and reading is replete with studies based on these traditions and the varied data collection and analysis methods that each has had associated with them (Ashworth 1996; Ashworth and

Lucas 2000; Beck et al. 1996; Bogdan and Bilken 1998; Brophy and Alleman 2005; Crawford et al. 1998; Entwistle 1997; Linder and Marshall 2003; Loughhland et al. 2002; Marton et al. 1993; Prosser 1994; Ravindran et al. 2005; Richardson 1999; Roberts 2003; Sandberg 1997; Sebastia and Torregrosa 2005; Tillema 1995; Trigwell 2006; Trigwell and Prosser 1991; Trigwell and Prosser 1997). A phenomenographic approach was chosen due to my interest in identifying and categorizing the variation or diversity of conceptions that emerges from the responses of elementary teacher candidates when asked to reveal their conceptions of geography and the learning of geography.

2.8.2 Phenomenography in Practice

The outcomes of phenomenographic analysis are represented as a set of categories of description that are structurally linked to one another. The assumption of a structure among the categories is an element of the epistemology that underlies phenomenography. Akerlind refers to this as the phenomenographic proposition, “ways of experiencing represent a relationship between the experiencer and the phenomenon being experienced, leads to the expectation that different ways of experiencing will be logically related through the common phenomenon being experienced” (2005, 322). Thus, in phenomenographic analysis the researcher attempts to describe an emergent set of categories with a logically inclusive structure. This set of logically inclusive categories is referred to as the outcome space and must emerge from the data in relationship with the researcher. The categories are not determined in advance and the researcher must strive to describe the experience of the participants.

2.8.3 Phenomenography and Phenomenology

Typical of a phenomenographic study would be for the researcher to attempt to report the qualitatively different ways of conceiving a phenomena by a group of participants. For example, one might report the qualitatively different ways of conceiving the theory of the atom or the Heisenberg Uncertainty principle. In the context of this study, the question is *how do ETCs experience geography and the teaching of geography*. Lupson's comparative summary of phenomenology and phenomenography is shown in Table 5.

Table 5. Comparative Summary of Phenomenography and Phenomenology

Areas of Commonality	
<ul style="list-style-type: none"> • Concept of “life world” • Bracketing off of researcher preconceptions • A distinguishable phenomenon of interest • Correlation between the meaning object and the meaning act • A limiting horizon of meaning • The use of data reduction in the analysis phase • Descriptive in nature. 	
Areas of Difference	
Phenomenography	Phenomenology
<ul style="list-style-type: none"> • Aim: to establish a set of categories of qualitatively different ways of experiencing a phenomenon • Conceptual thought and pre-reflective experience are not distinguished • Adopts the participant’s or a second order perspective • Results: conceptions of a phenomenon. 	<ul style="list-style-type: none"> • Aim: Establish the essence of a phenomenon • Conceptual thought and pre-reflective experience are distinguished • Adopts the researcher’s or a first order perspective • Results: Identification of meaning units.

Source: Adapted from (Lupson 2007, 81)

Edmund Husserl, the founder of phenomenology, described phenomenology as attempting to clarify a single experience prior to an empirical study (as quoted in Spiegelberg 1982). Marton and Booth describe phenomenology as having human experience as the research object, however the research proceeds using a particular method to develop a single theory (1997). Marton and Booth state, “From the very beginning, phenomenology had the program of developing a single theory of experience by using a particular method, which, befitting a philosophy, is a philosophical method. Philosophers engage in investigating their own experience. Phenomenographers, in contrast, adopt an empirical orientation: they study the experience of others” (1997, 116). So, both phenomenology and phenomenography share human experience as the object of study, however the outcome and methods employed differ. An example given by Marton and Booth helps to clarify the difference: “Where a phenomenologist might ask, ‘How does this person experience her world?’ the phenomenographer would ask something more like, ‘What critical aspects of the ways of experiencing the world that make people able to handle it in more or less efficient ways?’” (1997, 117).

2.8.4 The Issue of Truthfulness

Marton and Booth consider the question of *truth* in phenomenographic analysis (1997). Marton and Booth suggest that others could ask questions such as: (1) Have you really captured how they experience the phenomena? (2) Would they have responded differently under other circumstances? (3) Can the findings be generalized to other situations at the individual levels or to a population, or to other populations at the group level? (1997). Marton and Booth respond to questions of this sort by saying:

“...even if one individual or another may have been misrepresented, even if some of the participants may not have functioned at their very best, even if what we have

observed of one individual or another in the particular situation is not totally typical of them, and even if the distribution of the different ways of experiencing the phenomenon in question may not be generalized to any population, we can still argue that we have identified the variation in how the phenomenon in question might be experienced by people with certain background characteristics” (1997, 107).

Claims in phenomenographic studies show simply that an individual can experience something in a certain way and not discount that there are other typical, advanced, or generalizable ways of experiencing the phenomenon (Marton and Booth 1997). However, Marton and Booth claim that “we may still very well have identified the variation in terms of which we can characterize the different ways the phenomenon appears to the particular person in different situations or different ways it appears to other similar groups” (1997, 58). For example, Bradbeer et al. identified conceptions of teaching, learning and geography among undergraduate geography majors in three countries. The study found that collectively the students held five distinct conceptions, however the researchers did not find a significant variation among the three groups of students regarding the conceptions held (2004). The point that Marton and Booth endeavor to make is that the identification of the different ways of experiencing a phenomenon in education is a worthwhile outcome of research (1997).

2.9 Summary

The epistemological basis for the study involves the following supporting structures found in the research literature: (1) response to the standards movement in geography education; (2) the teacher as the curricular – instructional gatekeeper; (3) the need for a focus on Early Childhood- Grade 4 ETCs; (4) learning outcomes are influenced by learning approaches which are related to conceptions of learning; (5) conceptions of learning are related to context. Select aspects of the professional

geography education community's response to the standards movement were reviewed. Noteworthy was the lack of attention paid to the conceptions that ETCs hold regarding geography. Also reviewed is the problematic nature of trying to influence teacher education programs, as well, as the lack of conceptual depth in geography among preservice teachers. Teachers, as curricular-instructional gatekeepers, were also reviewed. As the most influential component in education, teachers' knowledge of content and conceptual understanding is critical to effective learning. The lack of knowledge about geography education at the elementary level heralds the need for additional research. As a study situated in the constructivist learning theory, relevant review of educational psychology was conducted. This review argues for the choice of phenomenographic analysis as the data collection and analysis methodology appropriate for this study.

CHAPTER 3

RESEARCH METHODS

3.1 Introduction

In the previous chapter, mainstream theoretical approaches to understanding learning were described and a justification for the use of phenomenographic analysis was presented. The use of a phenomenographic methodology was chosen for this study due to its ability to reveal the diversity of ways in which Elementary Teacher Candidates (ETCs): (1) conceive of geography, and (2) conceive of the learning of geography. Phenomenographic analysis like other qualitative approaches is strongly iterative in nature. These studies proceed in a looping and revisionist fashion where the data collected and analyzed initially leads to the posing of new or revised questions. These new or revised questions are then subject to an iteration of data collection and analysis. Multiple iterations of this nature are expected as the search for understanding progresses (Creswell 1998).

This research study required two phases of data collection and analysis. The setting for each of the two phases was the same and is discussed jointly for both phases. Following a description of the setting, each phase of data collection and analysis is described in consecutive sections. The discussion of each phase includes a description of the participants, the data collection procedures, and the data analysis procedures.

In this chapter, the methodology of this study is discussed by first describing how critical issues of qualitative research were addressed, and then describing the specific components of the phenomenographic analysis. The portion of this chapter that describes how critical issues were addressed will include discussions of the role of the researcher, ethical issues in data collection, and questions of validity and reliability. The portion of the chapter that describes components of the phenomenographic analysis will include discussions of the setting, the participants, the data collection procedures, and the data analysis procedures.

3.2 Statement of Purpose and Research Questions

The research questions for this study consisted of an overarching framework question along with a series of subset questions to gather responses on ETCs conceptions of geography and the learning of geography. Consistent with the qualitative tradition and the phenomenographic method, these research objectives required that the study be conducted in two phases. The framework question and subset questions were:

Framework question:

- What are Elementary Teacher Candidates' conceptions of geography and conceptions of learning geography?

Subset questions:

- What is the diversity of categorization of Elementary Teacher Candidates' conceptions of geography?
- What is the diversity of categorization of Elementary Teacher Candidates' conceptions of learning geography?

- Do Elementary Teacher Candidates' conceptions of geography reflect a deep or shallow understanding of core ideas and content?
- Do Elementary Teacher Candidates' conceptions of geography suggest the ability to teach their students to use geography as an analytic framework for understanding the people, places, and environments of Earth?

3.3 Research Strategy

The nature of research proposed in this study of conceptions of geography was that of a constructivist qualitative/interpretivist perspective. Creswell describes qualitative/interpretivist research as an approach to understanding that is based on the use of open-ended questioning where participants express their own views about a world, making sense of it from a subjective historical and social perspective (2003). Meaning from the constructivist perspective is socially constructed as humans interact and engage with the world around them (Creswell 2003). Meaning therefore is varied and multiple, requiring the researcher to look for a complexity of views. Constructivist qualitative/interpretivist research eschews the quantification of learning and focuses instead on the categorization of true nature and diversity of individual understanding. By nature the research is inductive with meaning emergent from data collected in the field. It is from this qualitative/interpretivist perspective and the assumptions described above that this study of the conceptions of geography among ETCs has its philosophical basis.

3.4 Role of the Researcher

Given the constructivist/interpretivist nature of this research, it was necessary that the researcher was directly involved in all aspects of the study. This was particularly important for some initial considerations such as the recruitment of the research

participants and the choice of the research site. The constructivist/interpretivist knowledge claim views meaning as a social construct derived by humans as they engage with the world (Creswell 1998; 2003). It was therefore critically important that the researcher can access the target population and can establish a rapport with the participants which led to their candid responses to the prompting question and any subsequent interviews. As an adjunct faculty member in an elementary teacher education program and as a Professional Development School (PDS) cadre coordinator, the researcher had direct access to the participants of the study. The researcher was able to survey the ETCs directly or conduct the survey by proxy through other cadre coordinators working in the PDS program during the semesters of data collection. Additionally, as a professor of biology at the community college level, the researcher has taught individuals of typical college age for 30 years and has developed the skills necessary for communicating with them effectively.

In addition to the information gathering described above, the researcher was responsible for receiving Institutional Review Board approval at Texas State University-San Marcos. The researcher was also responsible for receiving approval to sample the ETCs from the elementary teacher education program department chair at the participating institution as well as Institutional Review Board approval from the university that the participants in the study attended. It was my responsibility to obtain consent of the participants and monitor the human participants consent process for any changes in status that occurred during the research process. All participants were informed of: (1) the right to withdraw voluntarily at any time; (2) the central purpose of the study; (3) the data collection and analysis procedures; (4) their rights of

confidentiality; (5) that participation was grade neutral; and, (6) about any known risks associated with their participation.

When deemed necessary, the researcher conducted all follow-up interviews for clarification or elaborative purposes. The researcher also served as one of the three primary reviewers of the responses and participated in all phases of the categorization process. The researcher conducted the descriptive analysis, developed and wrote the framework for the interpretation of the results, and wrote the subsequent discussion of the results.

3.5 Ethical Issues in Data Collection

There are no anticipated risks, neither psychological nor physical, for the participants in this study. All ethical protocols required as common practice and by the participating institutions in qualitative studies involving human participants were followed by the researcher (Creswell 1998; Maxwell 2005). Prior to the data collection phase of the study, Institutional Review Board (IRB) approval was obtained from both Texas State University-San Marcos and the university that provided the setting and participants.

3.6 Validity and Reliability

The establishment of validity and reliability is important in phenomenographic studies, however given its non-dualist theoretical position there are alternative assertions as to the fulfillment of these requirements. Validity is often justified through the provision of a full and open account of the methods and results of the study (Cope and Ward 2002). Further the credibility and trustworthiness of the researcher may be considered in the determination of validity (Booth 1992). Some authors reporting the

results of a phenomenographic analysis claim that they will make available the original data upon request as further evidence of the validity of their data analysis (Cope and Ward 2002).

Cope argues that judgment of reliability is not appropriate in phenomenographic analysis (2000). Given that different researchers bring different prior knowledge to the analysis and that the suppression of prior knowledge is impossible as different researchers cannot be expected to find identical perceptions. What can be expected is referred to as the issue of *communicability* which refers to the ability of another researcher when provided with a description of the conceptions and the original data to see the different conceptions identified by the original researcher in that original data. Cope and Ward (2002) state “The outcome space of related perceptions which form the findings of the research are, therefore, constituted as a relation between an individual researcher and the data. What is important, however, is that the findings are described in a manner which communicates to other researchers the critical differences and relationships between the perceptions.” Cope’s position is supported by LeCompte and Preissle (1993) who suggest that the “canons of reliability for quantitative research may simply be unworkable for qualitative research.” Cohen et al. argue that the uniqueness and idiosyncrasy of situations used in qualitative studies are strengths rather than weaknesses (2007). Clearly issues of validity and reliability exist in the context of qualitative research and the academic literature provides suggestions and recommendations for how to address them.

3.6.1 Validity

Often quoted in discussions of validity in the context of phenomenographic analysis are the arguments made by Steinar Kvale. He states that in the social sciences, validity is based on “a correspondence theory within the context of positivist epistemological assumptions” (1995, 22). An alternative description of validity refers to the correspondence between the measurement instrument and the accuracy by which it measures its intended phenomenon. Measurement instruments referred to here are often psychometric in nature with the intention of objectifying interpretations of phenomena such as learning. Statements of this nature suggest objectivist views of knowledge and given the interpretive nature of this research represent a mismatched conception of validity.

The approach to ensuring validity chosen for this study is based on the work of Sandberg (2005). Sandberg provides an approach to achieving validity that may be summarized in a rubric consisting of different forms of validity and steps a researcher can undertake to fulfill them (2005), as shown in Table 6.

Table 6. Validity Rubric based on Sandberg 2005

Type of Validity	Steps Taken by Researcher
Pragmatic	<ul style="list-style-type: none"> • Use clarifying examples of one's interpretation • Engage in the observation of participants • Attempt to relate to practical application • Assess the usefulness of the results
Transgressive	<ul style="list-style-type: none"> • Attempt to find contradictions
Communicative	<ul style="list-style-type: none"> • Involve others in the interpretation • Verify that interpretations are coherent • Discuss results with other researchers • Treat participant responses as dialogue

3.6.2 Reliability

Given the previous discussion about the inappropriateness of objectivist approaches to reliability, this study adopted the recommendations of Cope who argued that communicability is a more philosophically consistent construct for interpretive studies (2000). In both phases of the study, descriptions of the emergent categories were discussed on a number of occasions with a fellow researcher closely involved in the study and with experienced teachers in the elementary classroom. These discussions continued until a consensus definition of the category emerged and was agreed upon. Given that these categories represent critical differences between conceptions, it is expected that another researcher would be able to recognize these categories in the original data.

3.6.3 Specific Strategies for Validating Findings

Given that the data collection and data analysis processes were expected to ultimately lead to the description of the diversity of categories of conceptions, it was important to eschew cause and effect thinking, as well as, resist early hypothesis formation or the adaptation of the data to prior interpretive constructs (Ashworth and Lucas 2000). The use of a phenomenographic tradition in research presents two broad threats to validity. One of these threats is that of bias where, due to the subjectivity of the researcher, data are selected that fit existing theory or preconceptions (Miles and Huberman 1994). Bias also occurs when the researcher selects data that *stand out*, again due to subjectivity on the part of that researcher. A second threat to validity is described by Maxwell as *reactivity* (Maxwell 2005). Often referred to as the effect of the researcher, reactivity refers to the influence that the researcher has on the setting and participants being studied. Neither bias nor reactivity can be eliminated, so it is important

in a qualitative study of this nature to understand how the researcher might be influencing the participant's responses.

The findings of this research were validated through the careful implementation of the following by: (1) analyzing responses with a sensitivity to individual conceptions of the phenomenon (their conception of geography and their conception of the learning of geography); (2) bracketing one's own preconceived ideas; (3) employing an iterative coding process developed through negotiation between multiple researchers; (4) the use of additional reviewers during critical stages of the categorization process; (5) resolving discrepant items through a negotiation process with other reviewers and select members of the participant sample; (6) using purposeful sampling of authentic elementary teacher candidates; (7) through the process of respondent validation, where the researcher solicits feedback about the data and conclusions from the research participants ; (8) providing detailed written instructions to all reviewers of the data; (9) using of the specific guiding question; "what does this participants response tell me about their conceptions of geography" consistently during the analysis phase (Bryman 1988).

Guba and Lincoln argue that the positivist notion of validity in qualitative research should be replaced with the notion of authenticity (1989). Further, Maxwell suggests replacing validity with the more suitable term "understanding" (2005). Lincoln and Guba are supported by Bogdan and Biklen in their recommendation of the use of a set of guiding principles (1998). In an attempt to adhere to these principles, data collection and analysis employed the following:

1. Using a natural setting (the PDS classroom and authentic ETC's) as the source of the data;

2. Binding the interpretation within the context of conceptions of learning theory and accepted phenomenographic practice;
3. As an instructional method's course instructor and PDS cadre coordinator, the researcher was part of the researched world;
4. Interpreting descriptive data;
5. Paying careful attention to the process of data analysis rather than simply the outcomes;
6. Making great efforts to interpret data through the eyes of the participants;
7. Viewing the interpretation of meaning and intention as essential;
8. Following the recommendation of Marton and Booth that the emergent set of categories be parsimonious was also followed (1997).

3.7 Phenomenographic Analysis

3.7.1 Setting

The setting for this research study consisted of students enrolled in their elementary PDS I semester at a large comprehensive university located in north Texas. As administered at this institution, the PDS program consists of two semesters, the second of which is the formal student teaching semester. These two semesters are referred to as PDS I and PDS II respectively. PDS II requires that the student intern fulltime at two grade level classrooms appropriate to their chosen certification level. For example if Early Childhood-4 certification is selected then the PDS II intern will spend 7-8 weeks (referred to as rotations) in each of two classrooms within the preschool to fourth grade range. Specific grade level placement is often dependent on factors such as student preference, as well as, mentor teacher availability. Ideally, the two rotations will be

separated by at least one intervening grade level. For example if an intern's first rotation placement is first grade then, the second rotation should be at the third or fourth grade.

3.7.2 Professional Development School I

The data for this research were collected from students enrolled in the PDS I portion of their preparation to become certified teachers. This semester differed considerably from PDS II in that it included both a classroom portion with formal coursework and periods of observation within elementary classrooms. During the PDS I semester, students are organized in a cadre specific to a particular Independent School District (ISD). This institution currently supports 15 cadres on an annual basis. Since the program attempts to honor the intern's preference for a particular cadre, as well as, the ISD's capacity, cadre membership varies from 15 to 31 interns. Students in PDS I take four instructional methods classes together as a cadre over a two day period each week. These methods classes include language arts, mathematics, science, and social studies. The interns then spend two days of the week in an elementary classroom as an observer. The participant's surveyed in this study consisted of members of five different PDS I cadres. Data were collected from two PDS I cadres in the spring of 2007 and three cadres in the fall of 2007. All data were collected at the cadre's methods coursework location.

3.8 Phase One of the Study

3.8.1 Data Collection

The method of data collection and analysis was chosen to focus on the diversity of conceptions that the sample population had regarding geography as an elementary school subject. A categorization of the diversity of learning conceptions was the first step in a process of understanding what ideas elementary teacher candidates bring into their

curricular-instructional decision making regarding geography content (Ashworth and Lucas 2000). The proposed research reflected a need for studies that examine learning with an emphasis on direct experience rather than a focus on age appropriate thinking capacities and on logico-mathematical thinking acquired by expository teaching (Palincsar 1998). To collect the data needed for the study each subject was asked to respond to a prompt, in writing (See Appendix A for the Prompt Question Form). The prompting question was open ended and the subject was encouraged to write any and all things that came to mind. Following the method of data collection successfully employed by Bradbeer et al., participants were asked to give handwritten responses to a prompting question (2004). Each subject was given a Prompt Question Form on which to hand-write their responses.

3.8.2 Data Generation

The data generated consisted of lists of concepts that resulted from multiple readings of the original participant responses. The data analysis process was modeled after the analytic induction method (Bogdan and Bilken 1998; Brophy and Alleman 2005; Glaser and Strauss 1967; Patton 1990). Purposeful sampling was used so that individuals whose responses were believed to inform the development of core knowledge about elementary teacher candidates and their conceptions of geography were represented (Bogdan and Bilken 1998). The initial method of analysis chosen for this study required two researchers, exclusive of myself, to categorize a subsample (n=37) of the participant responses using a consensus coding process. Each researcher was provided with written instructions for processing the subsample responses. Each researcher was also given a listing of the responses of the subsample participants that had been transcribed into a

typed document so that the responses would be considered independent of any context. Given the constructivist/interpretivist nature of the study, categories were not pre-assigned. This supports the constructivist/interpretivist knowledge claim of openness to the complexity of views where meaning is understood as varied and multiple (Creswell 2003).

The two researchers conducted their review on the same set of sample responses. Response forms included in the sample set were chosen at random using a random number table. The objective of this review was to complete an initial categorization of the responses. Each of the two researchers then independently prepared a list of categories based on their review of the responses in the sample set. The categories were expected to reflect the diversity of ways in which the sample of elementary teacher candidates have experienced or currently conceptualize geography. The two researchers then met to discuss and compare the categories that had emerged from their individual analyses.

At this point I, as a third researcher entered into the discussion of the categories. Along with the two researchers we attempted to negotiate a common set of categories. In typical practice each researcher would then review a second sample set ($n \geq 20$), chosen at random, to attempt to classify them into the agreed upon categories.

Given the diversity of each of the two researcher's categorizations it was concluded that reaching a consensus would probably not be possible as each researcher was profoundly influenced by their respective backgrounds as a former elementary teacher and geo-education researcher. It should be noted that the reviewers had no previous experience with phenomenographic analysis. Following the recommendations of

Bryman, feedback was solicited from a group of experienced elementary teachers who were also doctoral students in curriculum and instruction (1988). Given this groups unanimous endorsement of the elementary teacher's categories, it was decided that responses to the original question were suboptimal for a traditional phenomenographic analysis. However, the data collected from this question did address the desire on the part of the researcher to deepen background knowledge about the conceptions of geography held by ETCs.

3.9 Phase Two of the Study

The original question that was used to generate data for analysis was chosen because of its presumed integration of both the ETC's knowledge of the content and the conceptions that the participant holds regarding the teaching and/or learning of that content at the EC-4 grade levels. The data generated by this question was insightful and did provide the researcher with a deeper understanding of this sample of ETCs knowledge of geography. However, the original question proved unsuitable for analysis that would achieve the objective of revealing a set of categories representing the diversity of conceptions held about geography and the learning of geography.

Given the qualitative nature of this study, which often proceeds in an iterative fashion, the need or necessity of further data collection and generation was not unexpected. A second approach, fashioned after the recommendations of Minasian-Batmanian et al. was then employed to generate data suitable for phenomenographic analysis of the nature described in Chapter Two (2006). The method of data collection modeled after Bradbeer et al. (2004) was retained however two new questions in the format recommended by Trigwell and Shale (2004) were used to survey the participants.

The use of Trigwell and Shale's approach had two distinct advantages over the previous methodology. The questions used as prompts had been shown to generate the desired data and the method was more appropriate for the phenomenographic analysis of large participant sample sizes such as were used in this study.

3.9.1 Data Collection

The method of data collection and analysis was chosen to focus on the diversity of conceptions that the sample population had regarding geography as an elementary school subject and the learning of geography. A categorization of the diversity of learning conceptions was the first step in a process of understanding what ideas regarding geography content might elementary teacher candidates bring into their curricular-instructional decision making (Ashworth and Lucas 2000). To collect the data needed for this phase of the study, each subject was asked to respond to two prompting questions in writing. The prompting question was open-ended and the subject was encouraged to write any and all things that came to mind. These questions were designed to generate the data needed for a phenomenographic analysis of the participant responses. Each subject was given Prompt Question Form on which to hand write their responses (Appendix A).

3.9.2 Data Generation

The analysis of the data followed the protocol recommended by Minasian-Batmanian et al. using shorter responses from a large number of participants (2006). Each appropriate response was considered as a piece or fragment of a whole that would represent the conceptions of geography held by the participants. Responses from two open-ended questions were considered separately. Responses from the first question were used to generate categories representative of the ETCs' conceptions of geography.

Responses from the second question were used to generate categories representative of the ETCs' conceptions of learning geography.

Individual steps taken to generate categories of conception, with respect to each data set, were the same. The phenomenographic analysis consisted of: (1) transcribing all responses into a word processing document to de-contextualize them; (2) printing the responses as an unsorted list; (3) reading through the entire list of responses three times; (4) beginning to list emergent categories while reading the list a fourth time; (5) continuing to read the list against a fluid list of categories; (6) evaluating the representativeness of each category while incorporating new category names and discarding those no longer deemed representative; and, (7) continuing this process until a parsimonious listing of conceptions representing the diversity of the data set emerged.

It is important to emphasize that in a phenomenographic analysis, similarities and differences are considered across categories rather than within students' responses (Marton and Booth 1997). Eklund and Myrskog state that the categories that emerge indicate qualitative differences in conceiving the phenomenon (geography in this case) not as a function of the amount of detail but as a unique way of understanding the phenomenon being researched (1998).

3.9.3 Phase Two Process Illustrated

The process description above may not adequately convey important details of the analysis. Unfortunately it is the lack of detail that has become one of the major criticisms of phenomenography. Akerlind urges phenomenographic researchers to include examples representative of their analysis in their writings (2005). Adopting this suggestion, several examples of data analysis are included for illustrative purposes. All of the participant

statements below have been contrived by the researcher and are for illustrative purposes only. For example, the following sentence could be used to describe one participant's conception of how geography is learned: "When I took geography I made flash cards of important locations and the characteristics of those locations. I then went over and over the cards until I had memorized the information."

This "surface" (or shallow) response is representative of a conception of learning geography as reproductive, information of short term use, for example long enough to reproduce the information on a test. Minasian-Batmanian refers to this as, "learning for the purpose of reproduction" (2006, 1895). Further, there is no apparent intention, "to develop a relational or coherent understanding" of geography (Minasian-Batmanian 2006, 1895).

Another example illustrates a conception of geography rather than the learning of geography: "Geography is the study of landforms and how that relates to the resources available to the people living in a location."

This is a deeper conception given the relational component. It communicates an environment-human interrelationship. This represents a conception beyond viewing geography as exclusively either of the human domain or of the physical domain. This statement also suggests intent on the part of the participant to focus on understanding.

Another example illustrates that similarities and differences are considered across, rather than within student responses. Consider the following three responses:

Nicea: "I studied for the [geography] tests by trying to *remember* the diagrams in the textbook and then *recall* them to answer the test questions. "

Frank: “I am a kinesthetic learner, all of the names and definitions freaked me out. I would *rehearse* the spelling of the term and its definition in front of a mirror.”

Sonja: “I tried to *memorize* all of the names in bold on the maps and then write them down on the margins of the test paper before I *forgot* them.”

Certain terms were italicized in these contrived statements to simplify the illustration. During the analysis of the participants’ responses, the terms shown in italics would be underlined or highlighted. The terms *remember*, *recall*, *rehearse*, *memorize* share a degree of similarity although they do have distinctive meanings. However, these terms might form the basis for a category such as learning geography as memorizing. The term *forgot* in the last response would support such as category as well, given its relationship to the conception of memorizing.

3.10 Summary

This chapter described the research methods used for this study, namely the phenomenographic analysis of ETC’s conceptions of geography and the teaching of geography. Critical issues were addressed including discussions of the role of the researcher, ethical issues in data collection, and questions of validity and reliability. The use of a phenomenographic methodology was chosen for this study due to its ability to reveal the diversity of ways in which ETCs conceive of geography and the learning of geography. The phenomenographic analysis conducted in this study required multiple episodes of data collection and data analysis. The study proceeded in a looping and revisionist fashion where the data collected and analyzed initially, led to the posing of new questions. These new questions were then subjected to an iteration of data collection and analysis. The study involved two sets of data collection and analysis from two

sample populations of ETCs. Methods of data collection and analysis were described in detail including illustrative examples of how the phenomenographic data was generated. The setting for each of the two phases was the same and was discussed jointly for both phases. Following a description of the setting, each phase of data collection and analysis was described in consecutive sections. The discussion of each Phase included the data collection procedures, and the data analysis procedures.

CHAPTER 4

ANALYSIS

“Geographic instruction at the elementary level should be based not only on key geographic understandings, but also on our knowledge of stages of children’s cognitive, psychological, and social development.”

S. Natoli

4.1 Introduction

This study was undertaken to conduct a phenomenographic analysis of the conceptions of geography and the conceptions of learning geography held by Elementary Teacher Candidates (ETCs). Given the constructivist/interpretivist nature of this study, the data collection required two separate phases. Findings for Phase One describe the results of the initial survey of Professional Development School (PDS) I students conducted in April and May of 2007. These findings describe the analysis of data that was generated from the question: What do you think a typical fifth grade student should know about geography?

The findings for Phase Two describe the phenomenographic analysis of data from a second sample of ETCs that was collected in the fall of 2007. The method of data collection recommended by Minasian-Batmanian for a large scale study was employed (2006). Short open-ended statements were collected from a large number of participants (n=77). Each statement in response to the Phase Two questions was considered to represent a fragment of a conception and putting these fragment statements together

produced a hierarchical list of the variation in the conceptions for a large participant sample. There were two open-ended questions asked of the participants in Phase Two:

Question #1: What is geography?

Question #2: How do you approach the study of geography?

Responses from these two questions led to a successful phenomenographic analysis and resulted in a set of categories that describe the experience of geography among the sample participants. ETCs' experience of geography includes a set of categories that captures the variation in the conceptions of geography held by these participants. Additionally ETCs experiences of geography included a set of categories that captured the variation in the conceptions of learning geography held by these participants. Findings for Phase One and Phase Two of this study are described in the succeeding sections.

4.2 Findings for Phase One Analysis

4.2.1 Phase One Participants

The participants in this study were ETCs enrolled in a PDS at a major public university in north Texas. The total PDS enrollment for the term of the study was 287. The ETCs were either enrolled in their final semester before graduation or within one semester of graduation. The PDS program places ETCs into local elementary and middle schools for a series of internships requiring them to observe and participate as teachers at two grade levels. These interns also participate in four content specific methods courses including math, science, social studies and reading. The ETCs will have completed all general education coursework, including those that are content knowledge specific such as math, science and social studies before entering the PDS program. Elementary teacher

candidates in the PDS program may select among several certifications which alter their professional education course requirements and possibly their general education requirements. These certifications include: grades Early Childhood- grade 4 (EC-4); grades 4-8; special education; bilingual; generalist; and specialist. Certifications are awarded through an examination process administered under the direction of the state education agency. Certification exams require varied levels of content-specific knowledge and in some cases such as special education or bilingual education may focus on specialized domains that are more procedural (i.e., roles, responsibilities, and behavioral management) than traditional content knowledge domains. ETCs do tend to show strong initial disposition toward desired grade level teaching as well as strong attraction toward the desired setting, as far as, a general classroom, a special education situation, or a bilingual classroom.

4.2.2 Specific Description of Participant Population

Participants were recruited from two PDS I cadres for the spring 2007 semester. A total of 73 ETCs volunteered to participate in this research study representing 37% of the PDS I enrollment for that semester for the institution. Females (n=67) comprised 92% of the study population with males (n=6) making up only 8%. The self-reported age range of the participants was a low of 21 to a high of 40. The median age of the study sample was 24. As shown in Fig. 3, there were six self-reported ethnic groups represented in the study sample.

Ethnicity of Phase One Participants

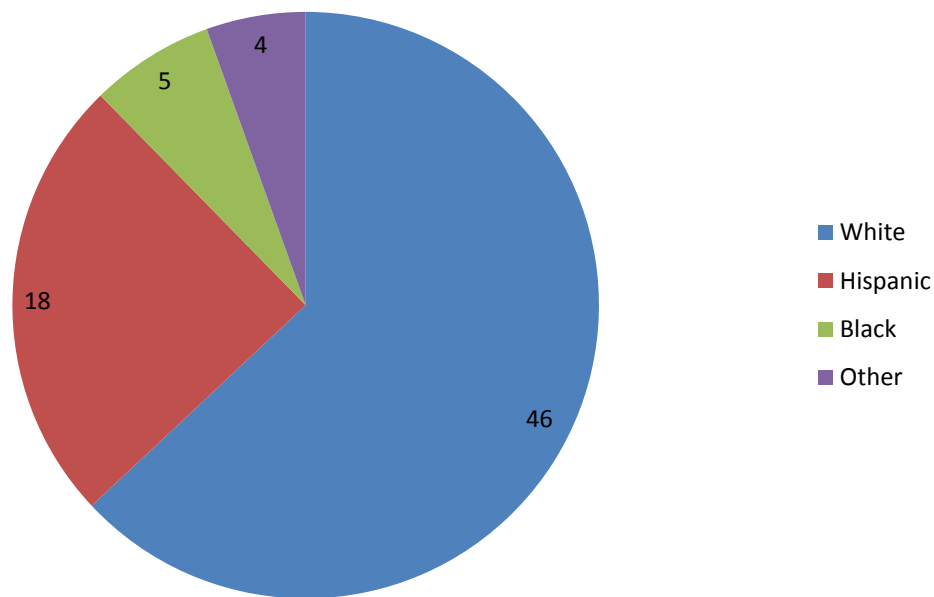


Fig. 3. Ethnicity of Phase One Participants

The dominant ethnicity was white (n=46), followed by Hispanic (some reported as Mexican) comprising 18 members of the study sample. Five participants were black, comprising only 7% of the participants. Asian (n=2), American Indian (n=1) and Pacific Islander (n=1) represented the remaining members of the study sample. These gender and ethnicity data are representative of the overall PDS population which is predominantly female and white.

Students in the PDS I program must select a grade range certification. In this sample population, EC-4 was the dominant choice (n=66), followed by grades 4-8 (n=6) and EC-8 (n=1). Students may also elect to pursue an additional certificate or endorsement such as Bilingual, Special Education, or English as a Second Language (ESL). Talented and Gifted does exist as an additional certification, however no one in the study sample indicated pursuit of this certificate. Most (n=46) did not elect to pursue any additional certification or endorsement. These individuals are referred to as EC-4 Generalists. There were a number (n=17) electing the Bilingual certification, which means that along with additional coursework, these ETCs must student teach in a bilingual classroom. Only four members of the sample elected the Special Education certification with six members choosing an ESL endorsement. Desired certification levels are shown in Fig. 4.

Certification Levels of Phase One Participants

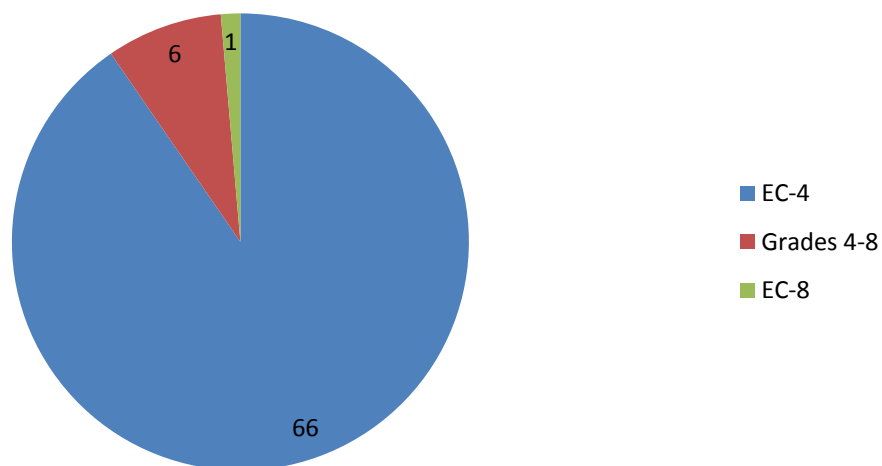


Fig. 4. Certification Levels of Phase One Participants

Participants were asked to select their desired grade level upon employment as a practicing teacher (see Fig. 5). The sample tended to choose desired grade levels at lower elementary with the median being second grade. Most ETCs (n=64) choose desired grade levels from the fourth grade down to Early Childhood. Only eight individuals (11%) selected grades 5 – 8 and one participant gave no response to this question.

Desired Grade Level Placement of Phase One Participants

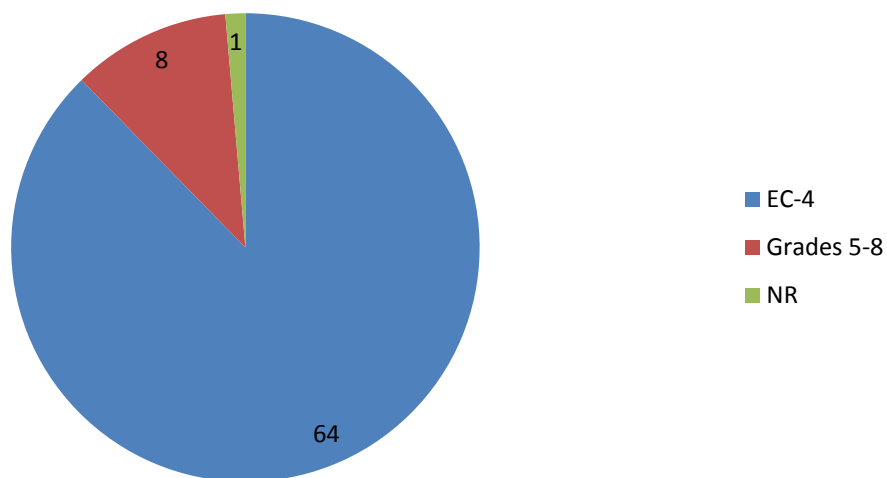


Fig. 5. Desired Grade Level Placement of Phase One Participants

Participants' were also asked to disclose their cumulative Grade Point Average (GPA). The median GPA was 3.5 (on a 4.0 scale) with the maximum and minimum as 4.0 and 2.3 respectively. Participants were also asked if they had taken a geography course as part of their undergraduate coursework. Thirty-four participants indicated that they had taken a course in geography and thirty-nine indicated that they had not taken a course in geography. Based on the wording chosen for responses to this question by some participants, confusion about whether they had prior coursework experience with a geography course appeared to exist. Some participants may have confused a previous geology course with the taking of a geography course. Follow-up, using email with three of the participants, confirmed some confusion regarding a distinction between the content of these two academic areas.

4.2.3 Disclosure of Travel Experiences

Participants were asked to briefly describe their previous travel experiences (see Fig. 6). This question required them to make a handwritten response, open-ended in nature.

Travel Experiences of Phase One Participants

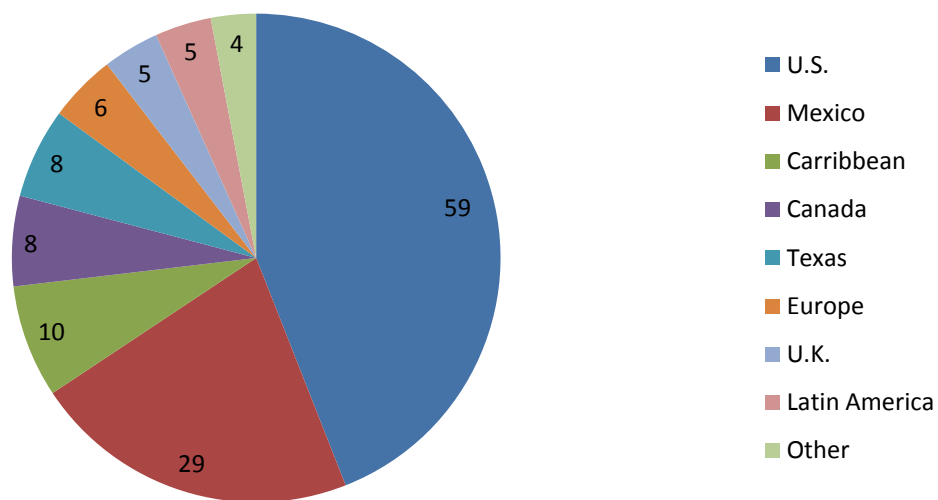


Fig. 6. Travel Experiences of Phase One Participants

The travel destination data was organized into twelve general destination categories from 134 reported locations including the categories Texas and the “remaining United States.” Those indicating “none” and those not responding to the question were two and four respectively. Travel within the State of Texas only was reported by eight participants. The three destinations receiving the highest selections were the U.S. (state destinations other than Texas), Mexico, and the Caribbean with 59, 29, and 10 selections, respectively. As many participants had visited Canada (n=8) as had traveled only in Texas. Countries in Europe (U.K. exclusive) were listed by six participants. England and Latin America were both listed by five participants, respectively. Travel to Asia (non-specified), Australia, Pakistan, and South Korea were each listed once.

4.2.4 Phase One Analysis

Phase One analysis began with the posing of research question #1. Participants were asked “What do you think a typical fifth grade student should know about geography?” Since the aim of this question was to deepen understanding of how ETCs conceive geography as subject matter taught in the elementary grades, short open-ended response statements from a large number of participants were used (N = 73). The generation of concepts based on the brief responses of a large number of participants was consistent with the methodology endorsed by Minasian-Batmanian (2006). Each response statement was treated as a piece of a conception where putting many pieces together allowed for the creation of a map of the structure of the variation for this large sample of ETCs. In response to the question, “what do you think a typical fifth grade student should know about geography,” ETCs’ statements revealed conceptions that seemed largely fragmented and focused on pieces of information of a geographical nature. The scope of

geography topics encompassed by the participant statements was quite expansive when considered in the representative whole with a total of 256 individual concepts revealed by the statements of the 73 participants. Additionally, the preponderance of conceptions would be classified in the domain of physical geography with frequent mention of macro-earth features, topography, landforms, and climate and weather processes.

The participants mentioned knowledge of states and capitols frequently, as well as, statements referring to map use and creation. Many participants emphasized knowledge of one's local geography only which included the geographical features of one's own city and state. Knowledge of region or country was mentioned infrequently. Concepts identified within the domain of human geography such as language, money, trade, transportation, races of people, and religion were relatively few and often non-repeating. Many participant statements included items that would not normally fall within the realm of lower elementary geographic instruction. These topics, each mentioned only once included Pangaea, seismic activity, planetary characteristics, time zones, and Earth's composition. Some statements revealed specific locations or landmarks such as the Rocky Mountains, the Great Lakes, the U.S. Capitol, and the Sahara Desert. These landmarks considered as the participant's main conception exemplify an overall shallow or rudimentary conception of the domain of geography.

Six topics had frequencies in the range of 10–14. Those most frequently mentioned concepts were related to three general categories including physical features, states, and maps. Continents and landforms were mentioned separately by 14 participants. States, states and capitols, and state's locations were listed by 13, 12, and 10 participants, respectively. Map reading was included in 10 of the participant statements. Continents,

maps, and states were each listed in various specific approaches. Responses about continents included the need to describe them or label them. Responses about maps also shared a variety of contexts such as decoding maps or using maps. Participant statements revealed six identifiable representations of knowledge related to “states” including those mentioned previously.

4.3 Major Conceptions

The Earth’s land masses and oceans, knowledge of states (presumptive of the United States), and location-related concepts emerged as major geographic conceptions. Continents as singular or context-specific conceptions were found in twenty four participant statements. Continents alone were listed fourteen times. Locating continents (n=5), naming continents (n=2), describing continents (n=2), and labeling continents (n=1) were also revealed in participant statements. State related concepts were listed in forty-nine participant statements. Participant’s use of the term “state” was presumed to be a United States specific reference in all instances regardless of whether or not there was explicit mention to that effect. This presumption was verified by subsequent email communication with several (n=3) participants as to their use of the term state as a United States specific reference. States (n=13), states and capitols (n=12), and location of states (n=10) were also listed in participant statements. Knowledge of state capitols was listed in four participant statements. Information about states and a state’s name along with its location were revealed by three participant statements, respectively. Knowledge of the names of the states was found in two participant statements. Knowledge of a state’s resources and knowledge of the surrounding states to one’s own was listed in one participant statement, respectively. There were twenty one map related statements with

map reading mentioned by ten participants, map use and map creation by four and two participants respectively. Maps, map coordinates, map decoding, map labeling, and finding places on a map were each revealed in one participant statement, respectively.

4.4 Minor Conceptions

Knowledge of rivers was contained in seven participant statements. Capitols and major world cultures were found in six participant statements. The location of continents, oceans, and oceans and continents were each revealed in five participant statements. Ten minor concepts were listed by four participants. These were countries, latitude, longitude, major lakes, map use, mountains, the location of oceans, regions of the U.S., state capitols, and weather. The cardinal directions, use of a compass, bordering countries, the location of countries, major countries, rocks, information about states, and the name and location of states were each found in participant statements three times. There were fifteen concepts listed two times each and 55 items mentioned only once.

4.5 Referential and Structural Conceptions of Geography

In the next section of this chapter, select examples of Phase One participant statements are interpreted in terms of their potential to convey a referential or a structural conception on the part of the participant. In this context “referential” is defined as addressing the “what” of the phenomenon, and “structural” is defined as the “how” of the phenomenon. Therefore, referential conceptions in this study relate to the question, “What is the experience of geography for the participant?” and structural conceptions relate to the question, “How does the participant conceive of the learning of geography?” This approach to data analysis is consistent with the recommendations of Prosser and

Trigwell, and serves as a first step in revealing the diversity of conceptions held by the participants (1999).

ETC's responses were frequently listings of geography objects that the elementary student should "know." Statements such as know, know name of, and know location of were extensive. The use of Bloom's taxonomic category "know" was not surprising; given its explicit use in the prompting question "What should a typical fifth grade student know about geography?" Illustrative example statements are provided demonstrating referential and structural conceptions of geography. Seven categories are illustrated including; continents and oceans, states, education centric, maps, application and affect, deep(er) geography, and environs.

4.5.1 Continents and Oceans

Continents and oceans were frequent items mentioned with 59% of the participants listing the ability to name and/or locate as something a fifth grade student should know. Continents with no mention of oceans were listed by 27% of the participants where oceans with no mention of continents were listed by 3%. Co-listing of continents and oceans were found in 37% of the responses. Responses representative of continents and oceans are:

Jill: "I think a typical 5th grader should be to know...the 5 oceans, the names of all of the continents..."

Alice: "I also think that students should know what the names of the five oceans are and their locations."

Darla: "The[y] should know and be able to label the different continents and oceans."

4.5.2 States

Participant statements often contained the term “states” as information a 5th grade student should know, occurring in 59 percent of the responses. Knowledge of state names, capitols, and locations were listed explicitly. The ability to locate a state was listed in 21 percent of participant responses. State names and capitols were 9 percent and 29 percent respectively. Participant statements expressive of conceptions of states are:

Misty: “Therefore, students should know the location of each state as well as use a map to obtain information.”

Greta: “I think that a typical 5th grader should be able to know all of the 50 states, name them...”

4.5.3 Education centric

Some statements reflected education directed thinking. These statements used education specific language or refer to concepts relevant to the immediate experience of the student teacher:

Misty: “what is specified in the state standards”

Oscar: “facts should be presented more in context”

Monica: “encourage students to start viewing the world as a piece of the larger whole that is all interconnected”

4.5.4 Maps

Also well represented among the responses was knowledge related to maps, including map use, map reading, map creation, directions, and time.

Jan: “I do know they should be able to label a US map and know capitals”

Gerry: "...locating places on a map using long[itude] and latitude, knowing how to find due North, use a compass and other tools."

Laila: "They should be able to distinguish between latitude and longitude, and label continents, some countries, and states on a map."

Oscar: "They should know how to read a map."

4.5.5 Application and Affect

A number of expressive statements were extracted from the data collected. In some cases these statements comprised the entirety of the ETC's response with no accompanying mention of specific geography concepts or topics. These statements were representative of conceptions that conveyed the application of knowledge to personal effect or statements that would be considered in the affective domain. Examples of statements illustrating application and affect are illustrated in the following excerpts:

Halpesh: "apply geography to our lives"

Bill: "Geography is important"

Frank: "the definition of geography and its relevancy...relevancy is the most important thing to find purpose to learn"

Mandy: "I'm not really sure."

4.5.6 Deep(er) Geography

Some statements were more integrative, supporting the notion of higher order thinking skills such as the use of geographic information in decision making, or the suggestion of interactivity and interrelationships. Illustrative examples include:

Ambreen: "how land affects [the] culture of people living in major countries around the world"

Jaun: “plan and research for a safe and productive trip”

Burt: “major rivers correlating to US history”

4.5.7 Environs

Some statements belied a focus on the geography of one’s own surroundings only or their environs:

Janice: “familiar with the surrounding area”

Anila: “know the cities that surround where they are”

Burt: “I think elementary students should focus mostly on the United States geography.”

Louis: “They should know our capitol.”

4.6 Summary

These categories and the illustrative examples provide important background information to this study. They reveal seven major aspects of the participants’ conceptions of the referential and structural nature of geography. Three of the conceptions, including continents and oceans, states, and maps refer more to the study of geography’s objects. Continents and oceans as the Earth’s major physical features, states as the organization framework in the U.S., and maps as representative of location represent more surface conceptions in the absence of additional commentary about how they might be interrelated or interactive. The remaining four categories emerge from statements that communicate possibly deep level thinking of interactivity or interrelationships among geographic object. This information helps to situate the interpretations and outcomes of Phase Two of this study.

4.7 Phenomenographic Approach to Phase One Data

As a means of insuring the reliability of the interpretation of the Phase One data, two additional researchers were invited to analyze a sub-sample (n=35) of the participant responses. The researchers were given a set of analytic principles to follow in their review of the statements; these principles were consistent with accepted practice in phenomenographic research (Appendix C). Each of the two researchers was chosen based on their unique background and experiences. Reviewer A is a tenured professor of education with a special interest in geographic education and has pursued a research agenda in geographic learning for over four years. Reviewer B is a doctoral candidate in curriculum and instruction with nine years experience as a classroom teacher at the elementary level. It was anticipated that each would represent one of the two constituencies; the professional geo-education community and the professional elementary education community respectively. After two weeks of private review, the reviewers and I met to discuss their efforts in assigning the sub-sample of participant response statements to a set of self-derived categories. The entire interview and discussion was digitally recorded for later review and interpretation.

4.7.1 Background Specific Interpretation of the Data

Creswell makes clear the emergent nature of qualitative research with the potential for change in both the research questions as well as the data collection procedures (2003). He states, “The theory or general pattern of understanding will emerge as it begins with initial codes, develops into broad themes and coalesces into a grounded theory or broad interpretation” (2003, 183). This certainly foretells the path of data interpretation and subsequent need for additional data collection in this research study. Based on previous phenomenographic studies published in the literature, it was

anticipated that the interpretations and analyses of Reviewer A and Reviewer B would with discussion and refinement reach a consensus. This proved not to be the case as their individual analyses reflected divergent streams that in hindsight perfectly represented their professional experiences and background. In short Reviewer A's interpretation of the sub-sample responses was "geography-centric" with an initial emphasis on the "locational features of the five themes at the recall level." Correspondingly Reviewer B's interpretation of the responses was more centered on the "use of knowledge and the cognitive process." Reviewer B's analysis spoke of an elementary "teacher-centric" representation of the data. These geography-centric and teacher-centric foci bear further detail and discussion.

4.7.2 Geography-Centric Interpretation of the Data

Reviewer A describes his analysis of the data as one of initial puzzlement, requiring a second and then a third reading of the entire set of responses in order for categories to begin to emerge. Reviewer A admitted to looking for similarities using different colored markers to identify possible category members. In the interview, Reviewer A reported a concern of bias and admitted that his professional background in geography "may be interfering with his categorization." The result of his knowledge of the "standards" movement in geography education over the last two decades and his concern over a biased interpretation of the data was a frequent admission. It bears noting at this point that Reviewer A's K-12 teaching experience spanned three years immediately after publication of the national geography standards. Discussions with Reviewer A revealed that he had made use of the "Five Themes" of geography as an organizing framework in his classes (AAG 1984). The first category to emerge in

Reviewer A's analysis was one of "locational features in terms of the five themes [of geography]." These locational features represented knowledge at the recall level with representative responses framed as "know where" and "know about" in the participant statements. Reviewer A interpreted the "know about" statements as more expansive and noted that few participants mentioned "know how" in their responses. These participant statements eventually led Reviewer A to a category he describes as "forms of knowledge." Continuing his selection of categories, he is able to parse the participant statement in the sub-sample from an initial of two to a final of five more-or-less hierarchical categories. A summary of Reviewer A's categorization is included in Table 7.

Table 7. Reviewer A's Final Categorization of the Participant Responses

Category	Description
Forms of Knowledge	Know where, know about, know how
Centeredness	Local (most emphasis) vs. Global
Maps	Presence or absence of the terms: read, label, use, and create
Fields within geography	Cultural (races and practices), political, economic, and physical features
Connectedness of information	Very little mention of relationships

Upon further discussion with Reviewer A, he suggested an overall impression of the data that the participants in the study view geography largely as factual information and noted that there was very little about place relationships and interdependency. When asked if he felt that the sub-sample was probably representative of the participant population he stated that, “additional responses would likely help to clarify responses into the given categories.” Citing little about the connectedness of geographic concepts he had hoped that additional analysis would confirm whether this population viewed relationships as important or not. Reviewer A closed the interview by stating that the question that was posed to the participants was more epistemological rather than normative in nature.

4.7.3 Teacher–Centric Interpretation of the Data

Reviewer B’s analysis of the participant statements “focused on differences rather than similarities.” She initially parsed the statements into two categories based on those representing “knowing” and those representing “understanding.” Upon further review of the participant responses, she was more comfortable in identifying additional categories, each with greater detail. Reviewer B admitted being influenced by Bloom’s Taxonomy and attempted to frame the responses accordingly. She further tried to consider what teaching “value” the respondent might be placing on their responses. Reviewer B suggested that three readings of the sub-sample responses were necessary to fix the items into short term memory. A final set of three categories emerged based on a framework of knowledge and cognitive process skills. A summary of Reviewer B’s categorization is included in Table 8.

Table 8. Reviewer B's Final Categorization of the Participant Responses

Category	Description
Knowledge and Comprehension	Information to be memorized for recall at a later time: Location – regional Location – national What are physical features? Awareness – global or national Resources – know Cultural traits – know Awareness of community Landmarks Symbols of states Comparing size of locations Solar system Longitude and latitude Types of maps General climate Awareness of economic factors
Application and Analysis	Concern about the lack of statements that would describe needed processing skills such as use of maps, use of tools, change over time: Use of maps – general Use of tools Use of geography in everyday life Effects of climate Economics Change in physical features over time Use of directions to locate Effect of geography on overall culture Create maps Geography's connection to history Why change takes place
Affect	State standards Not core knowledge Development of knowledge over time Geography is important

Reviewer B's overall impression of the sub-sample data was one of sadness reflected in the ETCs identification of topics of a shallow or rote nature. She suggested that classroom teachers are "jaded by accountability." She commented further that "because social studies is not a tested subject [in Texas] it is pushed to the back burner." Reviewer B also felt that a refinement of the categories or possibly the emergence of new categories, where possible, with further analysis of the participant sample.

4.8 Resolving Differences

Given the background-specific nature of how the two professional reviewers categorized the sub-sample responses, I elected to discuss Reviewer B's analysis with a group of experienced teachers whose varied background and experience overlapped with hers to some extent. All members of the group were knowledgeable and experienced K-12 teachers. The membership of this discussion group consisted of an elementary teacher and science consultant pursuing a doctorate in science education, a middle school reading teacher, an elementary language arts teacher and doctoral candidate, a retired elementary language arts teacher and doctoral candidate, and a middle school social studies teacher. Reviewer B also attended the discussion session. After being briefed about the nature of the research and the background-centric interpretation of the sub-sample responses the group was unanimous in agreement that Reviewer B interpreted the data from an elementary teacher-centric perspective. The group's discussion supported this expectation by stating that given the heavy emphasis in preservice teacher education and in-service expectations of teaching in a standards-based environment, an elementary teacher would be drawn to a focus on uses of knowledge and cognitive processes in their interpretation

of the participant responses. The analysis of data generated from revised questions is presented in the next section.

4.9 Findings for Phase Two

4.9.1 Phase Two Participants

The participants in Phase Two of the study were elementary teacher candidates' enrolled in Professional Development School cadres at a major public university in north Texas. The ETCs were either enrolled in their final semester before graduation or within one semester of graduation. The PDS program places ETCs into local elementary and middle schools for a series of internships requiring them to observe and participate as teachers at two grade levels. These interns also participate in four content specific methods courses including math, science, social studies, and reading. The ETCs will have completed all general education coursework, including those that are content knowledge specific such as math, science, and social studies before entering the PDS program. Explicit coursework in geography is not required of most elementary education majors at this university unless the student is pursuing middle school certification. Elementary teacher candidates in the PDS program may select among several certifications which alter their professional education course requirements and possibly their general education requirements. These certifications include; grades EC-4, grades 4-8, special education, bilingual, generalist, and specialist. Certifications are awarded through an examination process administered under the direction of the state education agency. Certification exams require varied levels of content-specific knowledge and in some cases such as special education or bilingual education may focus on specialized domains that are more procedural (i.e., roles, responsibilities, and behavioral management) than

traditional content knowledge domains. Elementary teacher candidates do tend to show strong initial disposition toward desired grade level teaching, as well as, strong attraction toward the desired setting as far as a general classroom, a special education situation, or a bilingual classroom (personal observation).

4.9.2 Specific Description of Phase Two Participant Population

The aim of this phase of the research study was to conduct a phenomenographic analysis of the conceptions of geography and the conceptions of teaching geography held by ETCs. To accomplish this goal, participants from three PDS I cadres operating in the Fall 2007 semester. A total of 77 ETCs volunteered to participate in this research study representing 43% of the PDS I enrollment for that semester for the institution. Females (n=72) comprised 94% of the study population with males (n=5) making up only 6%. The self reported age range of the participants was a low of twenty to a high of forty six. The median age of the study sample was twenty three. Fig. 7 shows the three self reporting ethnic groups the study sample comprised.

Ethnicity of Phase Two Participants

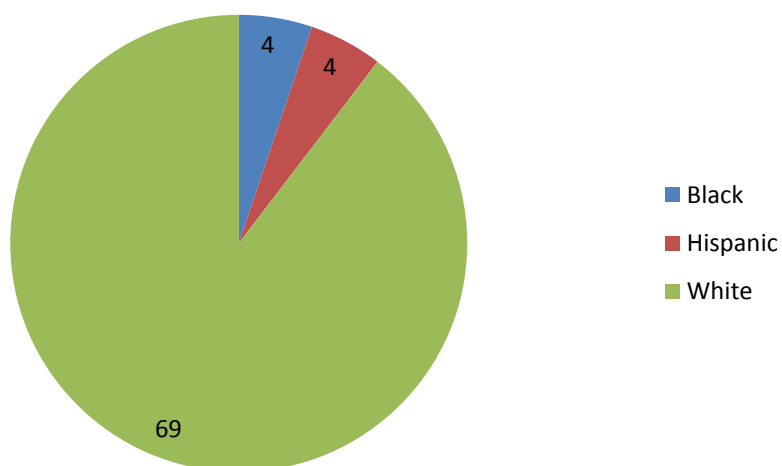


Fig. 7. Ethnicity of Phase Two Participants

The dominant ethnicity was White (n=69), followed by Hispanic comprising four members of the study sample. Four participants were Black, comprising only 5% of the participants. In summary 90% of the participants were White, 5% were Hispanic and 5% were Black. No other ethnic groups were represented in the sample.

Students in the PDS I program must select a grade range certification. In this sample population, EC-4 was the dominant choice (n=61), followed by grades 4-8 (n=16). Students may also elect to pursue an additional certificate or endorsement such as Bilingual, Special Education, or English as a Second Language(ESL) (See Fig. 8). Talented and Gifted does exist as an additional certification, however no one in the study sample indicated pursuit of this certificate. Most (n=65) did not elect to pursue any additional certification or endorsement. These individuals are referred to as EC-4 Generalists. One participant indicated that they were pursuing the Bilingual certification. Only two participants elected the Special Education certification with nine members choosing an ESL endorsement.

Certification Levels of Phase Two Participants

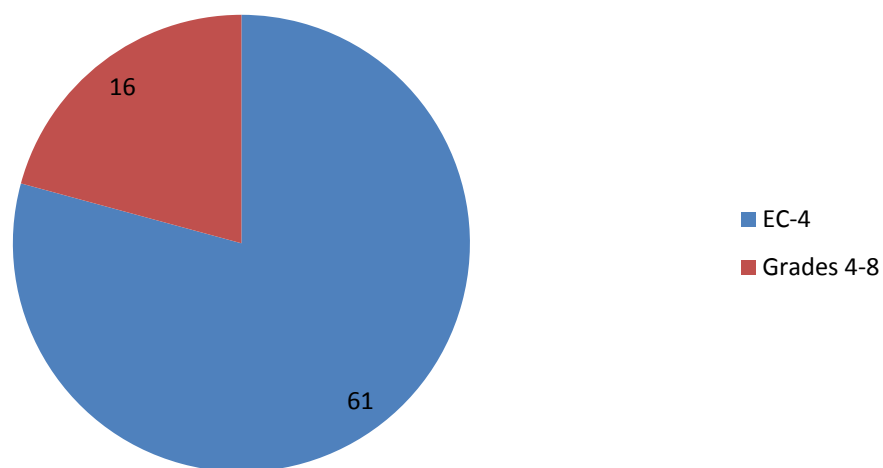


Fig. 8. Certification Levels of Phase Two Participants

Participants were asked to select their desired grade level upon employment as a practicing teacher (see Fig. 9). The sample population tended to represent desired grade levels at lower elementary with the median being a preference for the second grade. Most ETCs (n=61) choose desired grade levels from the fourth grade down to Early Childhood. Sixteen individuals (21%) selected grades 5 – 8.

Desired Grade Level Placement of Phase Two Participants

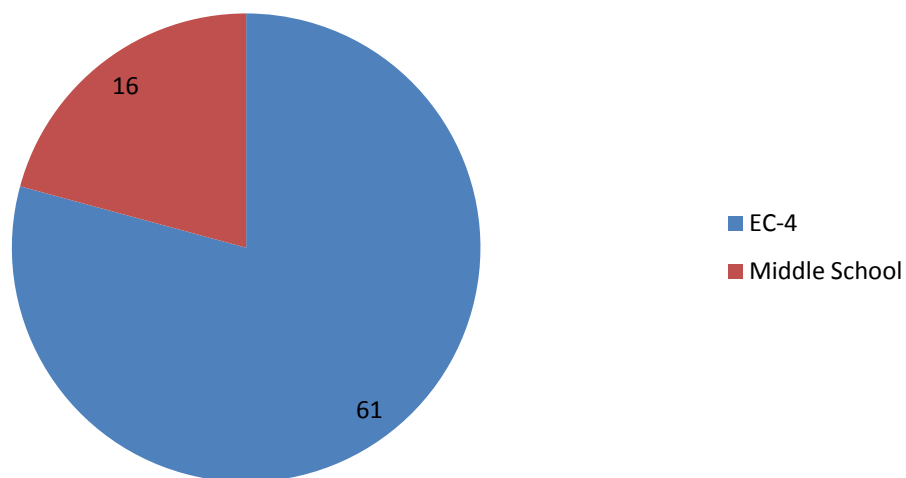


Fig. 9. Desired Grade Level Placement of Phase Two Participants

Participants' were asked to disclose their cumulative Grade Point Average. The median GPA was 3.43 (on a 4.0 scale) with the maximum and minimum as 4.0 and 2.75 respectively. Participants were also asked if they had taken a geography course as part of their undergraduate coursework. Forty seven participants indicated that they had and thirty indicated that they had not taken a course in geography as part of their undergraduate coursework.

4.9.3 Phase Two Participant Travel Experiences

Phase Two Participants were asked to describe their previous travel experiences (see Fig. 10). This question required them to make a handwritten response, open ended in nature.

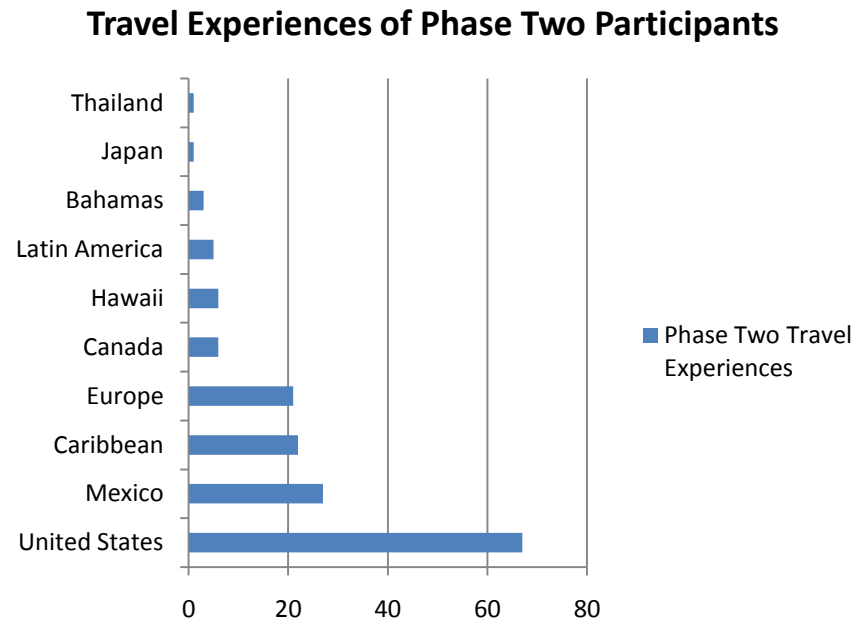


Fig. 10. Travel Experiences of Phase Two Participants

The travel destination data was organized into ten general destination categories from a 159 reported locations including the United States. Travel within the state of Texas only was not parsed out so the ten categories were exclusive of travel within the state of Texas. The three destinations receiving the highest selections were the U.S. (state destinations other than Texas), Mexico, and the Caribbean with 67, 27 and 22, respectively. As many participants had visited Canada (n=6) as had traveled to Hawaii. Countries in Europe (UK inclusive) were listed by twenty one participants. Latin America was listed by five participants and the Bahamas by three participants. Travel to Japan and Thailand were each listed once.

4.9.4 Phase Two Data Analysis

Given the constructivist/interpretivist nature of this study, attempts to resolve such background-specific differences using the initial data gathering protocol suggested the need to survey a new population of participants with revised questions. This supports the recommendation of Minasian-Batmanian et al. (2006) and Bradbeer et al. (2004) regarding the use of a large sampling of participants while interpreting individual responses collectively as representing the conceptions of the whole. In this revised methodology, two questions were presented to each participant in an open-ended format. Participants were encouraged to write as much as came to mind in response to the questions given them. The intent of the first question was to ascertain the ETC's conception of geography as an academic discipline. Our research focus is "does the participant's conception of geography reveal a surface or deep understanding?" The second question's intent was to ascertain the ETC's conception of the learning of geography. Our interest for this question is, "does the participant's conception of the

learning of geography align with a surface or deep approach to learning the subject matter?” The following narrative describes the findings of this phase of data collection and analysis. To distinguish the participant statements representative of Phase Two data analysis from those of Phase One, alphanumeric coding was used instead of personal names. Fig. 11 shows select Phase Two responses and their frequencies for representative purposes.

Frequencies of Select Phase Two Responses

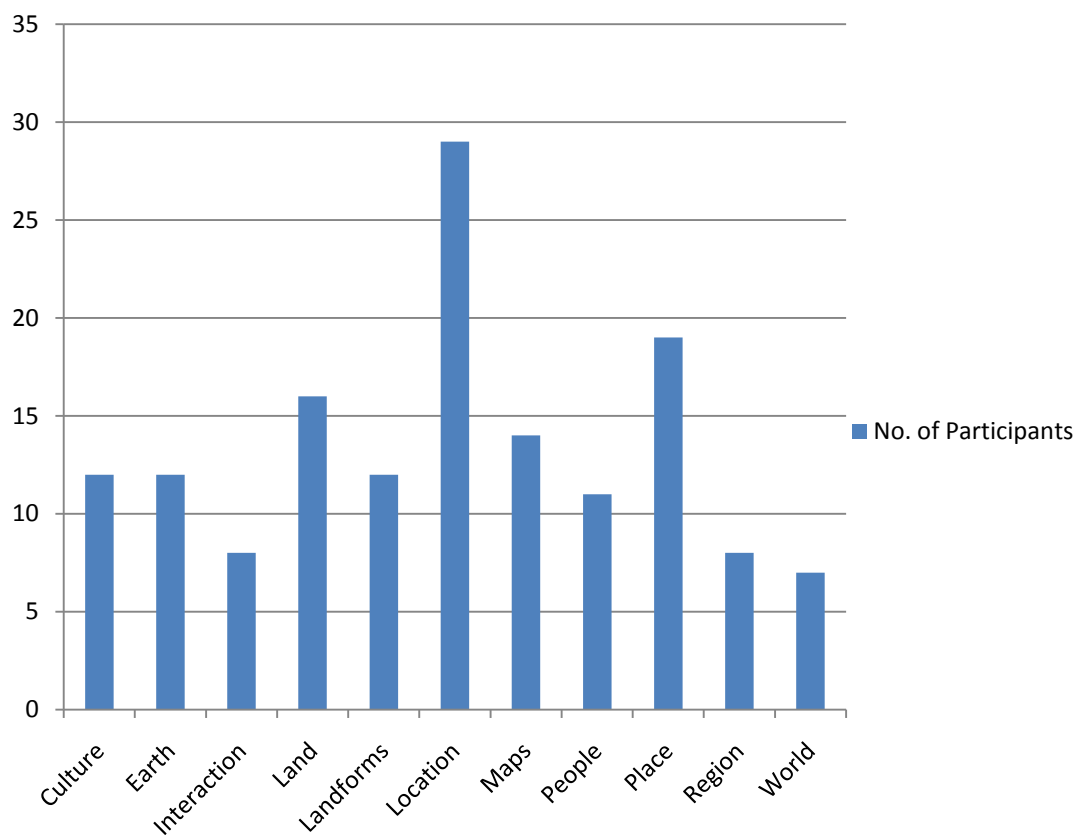


Fig. 11. Frequencies of Select Phase Two Responses

4.10 Conceptions of Geography

Statements from 73 participants were judged of sufficient clarity and appropriateness to be included in the phenomenographic analysis. Four participant responses were excluded as either unreadable or were responses that did not seem to be an appropriate response to the question posed. For example, a response that was not deemed as appropriate to the question: “What do you think geography is about?” was “I love geography.” Another response was simply the term “location.” The two remaining responses were unreadable. The majority of the responses were suitable for the phenomenographic analysis described in the following section.

Phenomenographic analysis of the remaining 73 participant responses revealed three distinct conceptions of geography. Two of the three were predominant, with the third emerging more infrequently (See Fig. 12). As described earlier, the categories that emerge often form a hierarchy with some (surface) conceptions being subsumed by more relational (deep) conceptions. It was also noted earlier that an important knowledge claim of phenomenography is the emergence of a finite number of categories for a given phenomenon. Phenomenographic studies conducted in other content areas revealed five to six conceptions as typical. Three conceptions of geography could clearly be identified with conception 1 subsuming under conception 2. Additionally both conceptions 1 and 2 were non-relational in nature. Conception 3 although emerging much less frequently than 1 and 2 was relational. As mentioned previously, some participant responses showed an apparent overlap and might have been able to be assigned to either of two categories. In these cases the response was assigned to the category with the more conservative interpretation. The set of three categories describe an outcome space defined by Marton and Booth as, “no more categories than is required to describe the variations of the

experience of learning; each category occupies a logical and often hierarchical relationship with the others; each category represents a specific perspective of the experience of learning for the sample of participants” (1997, 125). In the context of this research study, Marton and Booth’s statement is modified to state: no more categories than is required to describe the variations of the experience of geography; each category occupies a logical and often hierarchical relationship with the others; each category represents a specific perspective of the experience of geography for the sample of participants.

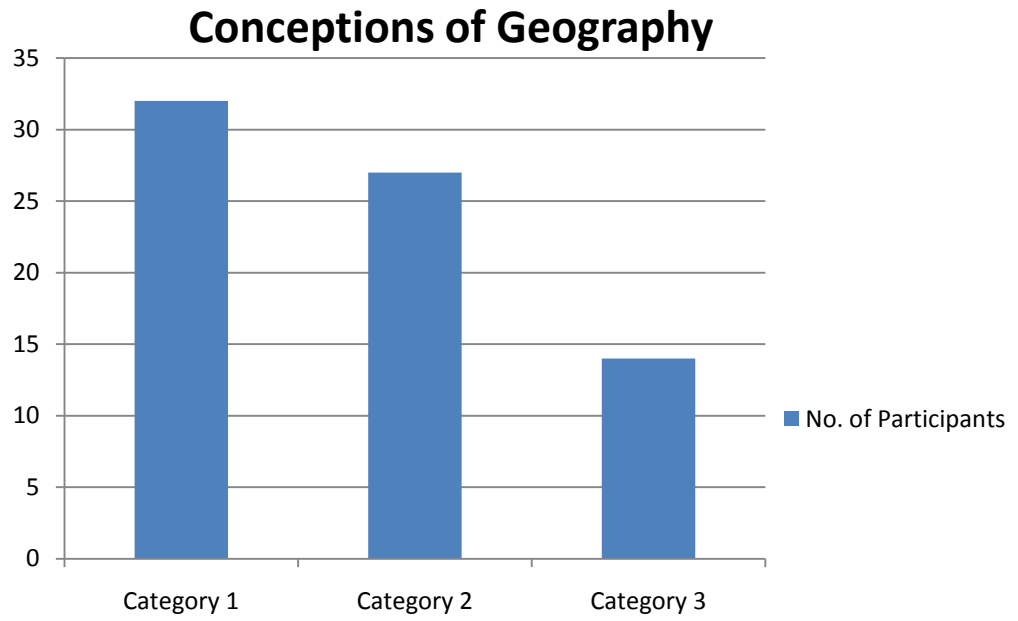


Fig. 12. Conceptions of Geography

4.10.1 Conception 1: Geography as the study of places and people

Participants represented by this conception were the majority (n=32). They tended to mention place, people, and place and people explicitly. If the term “location” was used, it was often mentioned along with people and places. No responses in this category made reference to the words “environment,” “world,” or the “earth.” The term, “landforms,” and “culture” were often mentioned; however, their context was non-relational suggesting that the participants conceived them simply as educational “objects.” The term “land” was mentioned in a number of responses; however the context often suggested that the participant used it interchangeably for the term “place.” Typical responses illustrating Conception 1 are:

MAF586 “Geography is the study of places and all that is in them.”

JLW590 “Geography is about studying places and the people who inhabit them.”

CLL949 “Geography is about the study of the people and cultures that live on the land.”

JMH9685 “Geography is about learning places and characteristics of those places.”

LM084 “Geography is about the study of land, people, and places.”

DNF996 “Geography is the study of the land, its features and the people that live there.”

4.10.2 Conception 2: Geography as the study of the world

Participant responses (n=27) that emerged to form this conception made no distinction between human and physical concepts. In some cases little or nothing else was written other than geography as the study of the world, the earth, or the globe. Participant responses suggested that the terms world and earth could be used interchangeably. Some

of the responses in this category positioned people and places in the world; however these were interpreted as non-relational.

Typical responses representing Conception 2 were:

KK069 “Geography is the study of people and places around the world.”

GGM291 “Geography is the study of our world and different regions.”

LW154 “Geography is the study of the Earth and its features.”

MP4812 “Geography is knowing the world around you.”

TMF106 “Geography is learning about the location of places and things on earth.”

4.10.3 Conception 3: Geography as the study of the world’s interactions

This conception emerged from the responses of 14 participants. A number of terms conveyed the concept of interaction. These terms included affect, effect, shape, correspond together, function together, and interact. There was no consensus as to the direction of interactivity among the human and the physical domains of geography. The concept of interactivity brings a relational component to the participants’ conception of geography. Conceptions that are relational in nature represent deeper thinking and so Conceptions 1 and 2 would be subsumed under Conception 3. Some responses described a human-physical interaction whereas others mention interactions among elements within the human and physical domains. Participant response statements illustrating Conception 3 were:

ADW744 “Geography is the study of different land forms and how the affect different societies around the world.”

CED3714 “Geography is the study of how the land affects the people and animals living on/in the land.”

PM634 “Geography is the study of climate, locations and natural land features and the way people live that shape where they live.”

SC364 “Geography is about not only the study of the earth (places), but the people and cultures in those places and how they correspond together.”

SPM541 “Geography is about climate of an area and how things are effected by evolution.”

JLR370 “Geography is the study of our Earth and the interactions among the land and its inhabitants.”

JT679 “Geography is learning about the land, people, and environmental interactions.”

These three conceptions of geography represent groupings of conceptions into categories. They do not represent individual conceptions as analysis was conducted on a collective level that was accomplished by assorting qualitatively similar statements that transected individual participant responses. Once these three categories were chosen, participant responses could be assigned to a particular category, although there was some overlap between adjacent categories. It is important to note that the unit of research is the collection of responses not the individual participants. Therefore the distribution of students within the categories is provided for background information only. If an individual’s response could reasonably be assigned to two adjacent categories, the assignment was made to the lower cognitive level category.

4.10.4 Conceptions of Learning Geography

The analysis of the data generated from the question, “As a student, how would you approach the study of geography?” revealed four distinct conceptions of learning. One of the four categories was predominant with the other three categories emerging with similar frequencies. Responses from 77 participants were collected and analyzed. Two responses were designated as unable to be categorized and twenty-two responses were

judged as not addressing the focus of the question. The remaining 53 responses were judged suitable for categorization as addressing the participants' conceptions of learning geography.

Although it is common practice in the literature to represent findings for this question using only the two categories of surface or deep conceptions of learning, four categories were described. Of the 53 responses analyzed, the majority (n=38) were identified as belonging to the lowest level conception. This category contained the conception of learning geography as simply an increase in knowledge. The three remaining conceptions of learning geography emerged six or fewer times from the participant statements. See Fig. 13.

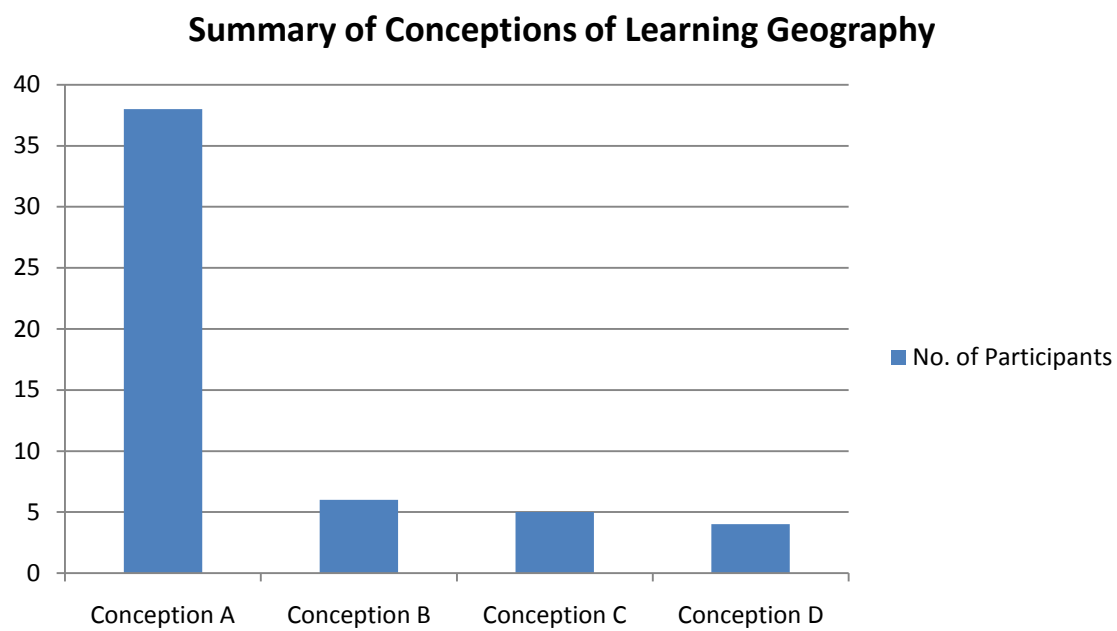


Fig. 13. Summary of Conceptions of Learning Geography

Conception A: Learning geography as knowledge acquired from someone or something.

This conception of learning geography emerged from 38 of the participant statements. It represented a surface conception of learning with the role of the student as a passive participant acquiring knowledge, namely of a factual nature from some expert source such as the teacher, map, or textbook. In some instances sources such as the internet, video, and photos were mentioned. Statements representative of this conception were:

TMF106 “To study a map I would cover up the names of the countries/cities/continents/oceans/etc; and try to remember what it was. I would also try to memorize the names of the places in order.”

MDR073 “Study maps and information about different parts of the world.”

ARY063 “ Just memorizing and studying through note cards highlighted notes. I would sometimes make my own maps to write on the test myself.”

HMB174 “I [would] read the textbook and study the bold faced words and concepts. They were the vocabulary words for each section....study several maps and learn all of the details about each map.”

KLN774 “I think an atlas and an almanac are both great resources to use to study geography.”

MP4812 “Memorize facts that are tested over. Creating acronyms for facts.”

Conception B: Learning geography as solving problems

Statements from six of the participants were assigned to this category. Participants who expressed this conception simply indicated the use of geographic information without describing the intended use or in some cases stated the intention. Participant statements in this category mentioned terms such as analyze, hands-on, interactive, and research. Illustrative examples of this conception are:

AT844 “I would have my students study maps and places...they could research and describe places they would like to visit.”

CM59W5 “Analyze data including populations and economics.”

GB849 “I would look on the internet to find information about specific destinations I was interested in.”

MDC176 “Read books on regions of Texas and other places so I could plan an awesome vacation.”

BLS478 “I would use various maps as tools to discover new areas.”

Conception C: *Learning geography as construction of personal understanding*

Five participant statements suggested the intent to use geographic information to develop their own understanding. Although the analysis of statements containing the word “understand” or “understanding” might be problematic, the explicit emphasis of this study was on knowledge construction. The literature suggests that some students use or imply these terms to represent either faster or more accurate memorization (Bradbeer et al. 2004). However, in this study understanding was interpreted as qualitatively different from that of simple memorization. The use of the term observation was interpreted as indicative of the intent on the part of the participant to construct meaning. Example statements are:

KG109 “To study geography I would observe the world around me; pay attention to each theme of geography.”

LAW7692 “Study where certain places were and how the physical features of the land [e]ffect the culture of the people that live there. This helps is understand the world we live in.”

TAK291 “I would study with a mix of memorization and relating things I already know to new facts.”

Conception D: *Learning geography as growing as a person or future teacher*

Four participant statements suggested that the study of geography would help them grow as a person or assist them in their future career as a teacher. This conception was consistent with Marton and Booth's amendment of Saljo's original conceptions of learning (1997; 1979). Marton and Booth argued that, "changing as a person" represents a conception qualitatively superior to understanding and seeing something in a different way (1997). Eklund-Myrskog referred to this as "forming a conception of one's own" (1998). Statements representative of this conception were:

CC823 "I would approach the study of geography from the perspective of how I would or could teach it. I would look for activities and age appropriateness."

KK069 "I would use both maps and the internet to become aware of how to teach the content to my future students."

SC364 "To study I would research areas of interest and the peoples and cultures in those areas. I would do this because I think it would help me grow as a person. Plus when I become a teacher it will help me to teach these things to my students."

These four conceptions of learning geography represented groupings of conceptions into categories. They did not represent individual conceptions as analysis was conducted on a collective level that was accomplished by sorting qualitatively similar statements that transected individual participant responses. Once these four categories were chosen, participant responses could then be assigned to a particular category although there was some overlap between adjacent categories. It is important to note that the unit of research is the collection of responses not the individual participants. Therefore, the distribution of students within the categories is provided for background information only.

4.11 Summary

The intent of Phase Two of this study was to generate data for the phenomenographic analysis of the conceptions of geography and the conceptions of learning geography held by a sample of ETCs. A sample of 77 participants was asked to give handwritten responses to two open-ended questions. These questions were, “what is geography” and “how would you study geography” respectively. Phenomenographic analysis of responses to the first question was parsed into 3 qualitatively distinct categories. These categories represented a range from object non-relational conceptions of geography to an object relational category of human–environmental interaction. Phenomenographic analysis of responses to the second question revealed four qualitatively distinct categories of conceptions of learning geography. Twenty-four participants’ statements were excluded from the analysis due to either their inability to categorize or their failure to address the question. Responses assigned to the first and most rudimentary category were predominant. However, the set of four categories did constitute a hierarchical arrangement with lower categories being subsumed by higher order categories of learning geography. It is interesting to note that some of the responses were representative of Marton’s et al. sixth category of growing or changing as a person (1997).

CHAPTER 5

CONCLUSIONS, CONTRIBUTIONS TO THE LITERATURE AND IMPLICATIONS

“We [geographers] are unlikely to start early and we need a long time to mature. Ours is a task of slow accumulation of knowledge, experience, and judgment; techniques and formal processes of analysis and of generalization are subordinate.”

(Sauer 1956, 288)

5.1 Introduction

Elementary teachers in the state of Texas are certified as generalists who teach across the subject matter disciplines of mathematics, language arts, social studies, and science. Thus, their subject matter preparation and their readiness to effectively teach in each of these areas are critically important. Specific to this study, their experience of geography takes on critical importance. Known connections between what conceptions teachers hold about a subject, how they approach the teaching of that subject and the quality of student learning outcomes provides the foundation for this study. This is the first study known to investigate the conceptions of geography and the conceptions of learning geography held by a sample of elementary teacher candidates (ETCs). It is argued that understanding ETCs’ conceptions of geography and their conceptions of learning geography offers critical insights into how to better prepare elementary teachers for their role as curricular-instructional gatekeepers and subject matter generalists.

The focus of this final chapter will be to:

- Discuss the findings of this research
- Draw conclusions related to the research framework question and the subsidiary questions
- Describe the significant contributions to the literature
- Indicate implications of the research findings to preservice teacher education
- Suggest implications of the research findings to geography education

This chapter will also outline my experience with phenomenography as the chosen methodology, as well as, make recommendations of future research pursuits. Positioned as a baseline study, this research sought to contribute to the research base by providing evidence of ETCs conceptions of geography and the learning of geography, an area poorly addressed in the education literature and not at all in the written history of geographic education. As a baseline study, it is hoped that future investigations could be planned based on empirical knowledge rather than on assumptions about what conceptions ETCs hold regarding geography. In order to discuss findings of this research study that are representative of these questions, this chapter is divided into four sections including; a discussion of the findings, the conclusions drawn from the findings, the contributions to the literature and the implications of this research study.

5.2 Review of Research Design and Data Collection

This research study examines the conceptions of geography and the conceptions of learning geography held by elementary teacher candidates completing their certification requirements at a large university in north Texas. In the context of this study, a conception means, “people’s ways of experiencing or making sense of their world” (Sandberg 2000, 12). Drawing on the general literature of conceptions of learning theory and using a constructivist approach an argument is made about the relationship between

the student's (in this case, the ETC) perception of the content and the approach they adopt to its study. Furthermore, the academic literature supports the connection between how teachers were taught and how they teach in their own classrooms. ETCs were chosen as participants in the study due to their future combined roles as curricular-instructional gatekeepers and subject matter generalists in their classrooms. It is argued that these teachers' conceptions of geography and their conceptions of learning geography are of critical importance in the determination of their ability to affect meaningful learning outcomes in geography at the elementary level.

Utilizing a purposeful sampling model, responses to open-ended question prompts from two samples of elementary teacher candidates were collected. The combined total number of participants was 150. The sampling took place in May and October of 2007. Each participant group was asked to respond in a handwritten fashion to open-ended questions. These questions were designed to try to capture the participants' ways of experiencing or making sense of geography and the experience or making sense of the learning of geography. Participants were encouraged to write freely, putting down any and all thoughts that came to mind. Data collection for the study required two phases. The analysis of the collective responses to the first sampling in May of 2007 suggested the need for additional sampling with revised questions. The portion of the study based on the May 2007 sampling is referred to as Phase One data collection and analysis. A second set of participants were surveyed in October of 2007 using revised question prompts (referred to as Phase Two). The number of participants in each phase was 73 and 77 respectively. Necessary instances of follow up questioning were conducted through the winter and spring using email and personal contact.

Following accepted methods of phenomenographic analysis, these responses were analyzed using iterative and inductive processes. The analysis of data collected in Phase One followed the recommendations of Prosser et al. (1996) and employed two professional educators which resulted in a teacher-centric and geographer-centric categorization of the data. Teacher-centric categorization refers to the selection of categories based on a framework derived from Bloom's Taxonomy of Educational Objectives (Bloom and Krathwohl 1989). Geography-centric categorization refers to the selection of categories based on geographic knowledge structures such as the Five Themes of Geography (AAG 1984). These two categorizations were deemed too unique to resolve using the process chosen.

Data collection and analysis for Phase Two followed the recommendations of Minasian-Batamanian et al. (2006). This methodology required that short written responses from a large number of participants are considered as fragments of a conception to be pieced together to reveal the diversity of conceptions held by the participant population.

5.3 Conclusions

The overall outcome of the data analysis conducted in Phase Two was the identification of conceptions of geography and the learning of geography arranged in a hierarchy (Marton and Boothe 1997). From the analysis three conceptions of geography and four conceptions of learning geography were identified. The term "outcome space" is used to refer to a set of categories and its relationships derived from a phenomenographic analysis. The outcome space for the conceptions of geography analysis suggested awareness among ETCs of geography as the study of places, people and the world. Additionally, the analysis revealed largely non-relational thinking towards geography.

The outcome space for the analysis of the conceptions of learning geography data suggested awareness of learning geography as simply knowledge acquired from someone or something as the predominant conception. However, learning conceptions of the higher taxonomic order were also revealed.

Taken together, the results of the data analysis for this study provide much insight into how elementary teacher candidates conceive of geography and the learning of geography. The results contradict the claims of conceptions of learning theory and phenomenography. ETCs demonstrated an experience of geography that is largely limited and undifferentiated while at the same time revealing conceptions of learning of geography as coherent and relational. A disconnect of this nature is noteworthy and has not been previously reported in the literature. This would suggest that the study participants have a shallow understanding of geography content knowledge yet demonstrate a pedagogical knowledge (or expectation of) of how to teach geography (at least some aspects of) effectively. The significance of the revealed disconnection between the conceptions of geography and the conceptions of learning geography will be discussed later in this chapter.

The research framework question for this study generated the overall design, data collection, and analysis process, and is shown below:

“What are elementary teacher candidate’s conceptions of geography and the learning of geography?”

5.3.1 Conceptions of Geography

Differing views of geography emerged from the analysis, although there was much overlap in the conceptions. ETCs’ conceptions of geography ranged from simple and unorganized lists of terms to lengthy coherent descriptions. Many participant

responses were similar in scope and nature to those reported by Catling (2002). However Catling's study participants were elementary students. Thus, one might wonder if the ETCs responses to the question prompt reflected projections as university students preparing to teach the subject matter or purely personal conceptions of geography. Their responses included both cognitive and affective commentary. Some ETCs described the experience of geography as boring while others commented that they found it fascinating. At least one participant admitted she could not define geography. Some responses appeared to reveal a confusion of the disciplines of geology and geography. Informal discussions with three elementary methods instructors revealed that they had this same concern. (pers. comm.) A search of the literature from 2002 – 2007 for studies related to ambiguous conceptions of these two disciplines proved fruitless. Given the apparent paucity of studies that explore ambiguous or naïve distinctions between geology and geography, research in this area appears worthwhile and in need of pursuit.

Collectively ETCs appeared to conceive of and use several terms interchangeably. These included Earth-World-Globe and Landform-Landmark-Landscape as prominent examples. Although the term “place” was mentioned frequently, the word “land” was as well and its contextual environment would indicate that ETCs viewed these terms as alternatives. This naivety of vocabulary use regarding concepts has been reported in the literature of science education (Klein 2000; Okhee and Fradd 1998; Wilson 1998). There seemed to be no distinction between geography's themes and geography's basic concepts, an observation reported by Gregg in her study of the relationship between content knowledge and choice of pedagogy in elementary teachers (2001). There was frequent use of certain terms such as, place, location, land, landform, and culture.

In some cases, geography was described as having practical application such as for planning travel, while for others geography was seen as more relational such as understanding the relationship between landforms and people's way of life.

Unexpectedly, concepts related to maps were mentioned, however maps and mapping were not mentioned at all by many of the participants. While geography at the early elementary levels should help children develop a greater sense of the world, there were responses suggesting a more local focus such as knowledge of the capitols of one's own state and its surrounding states or knowledge of one's own region. Some participants did emphasize the need to include knowledge of processes that affect both the human and physical environment, such as how the soil type and water availability would determine the type of food crops grown in that location. Collectively, many components of elementary school geography were revealed by the ETCs responses including;

- *Geographical skills* such as map reading, map making, use of compass and direction finding
- *Place* such as knowledge of local area and distant world, people and culture, regions, states, rivers, and landforms
- *Geographical themes* such as weather/climate, movement/migration, people/culture and environment/environmental change
- *Geographical concepts* such as location, landscape, distribution and environmental processes.

This listing comprises components of elementary level geography described by Catling (2002). Participants in this study were university seniors and so what was observed would not be considered knowledge and understanding of a deep and

integrative nature as described by Gregg (2001). However, in her study of postgraduate primary education majors in the United Kingdom, Martin observed similar findings where the conceptions of geography tended to be knowledge-based rather than processed-based with an emphasis on human-physical elements (2000).

ETCs conceptions of geography as an academic discipline could be interpreted as lacking depth, largely un-relational, and certainly not representative of the preparation expected under the proposed guidelines of the No Child Left Behind act. Some responses show a conception of geography very undifferentiated stating that it studies someplace or something about the world. As mentioned previously, participants used the terms, world, Earth, globe, and planet seemingly without distinction. As Bradbeer notes in his study, little distinction was specified between the terms world, earth and land with the environment (2004). Unlike other studies, ETCs made frequent mention of places and people and did not appear to distinguish between arbitrary divisions of the human and the physical. Actually there were no responses indicating knowledge of current curricular organization of human geography, physical geography and world regional geography. The conceptions of geography revealed in this study bear little resemblance to that contained in the national standards, Geography for Life (NCGE 1994).

5.3.2 Conceptions of Learning Geography

Differing views of learning geography emerged, however, pedagogic concepts and themes were mentioned frequently. Three of the four conceptions identified represented higher-order cognitive processes such as problem-solving, construction of personal meaning, and as a source of information for personal change. Absent from participants' views of learning geography was the listing of fieldwork or field study, a

view counter to the recommendations of reformers who herald a return to field study as a way of improving geography education (Le Heron et al. 2006). Statements from some of the participants recommended the use of “hands-on” activities as central to how they would teach geography and others did suggest travel to locations that were representative of the geography concept at hand. However, there was no explicit use of the terms fieldwork or field study.

Some ETCs indicated that they viewed the study of geography as an opportunity for personal growth; there were others who viewed its study in terms of how they would teach it to future learners. In particular, they would “look for opportunities for activities and age appropriateness,” or, “become more knowledgeable for my future students.” The phrase, “age appropriateness” receives common and frequent usage in the world of elementary teacher education as they are taught to review content with this foremost in their mind (Strong 2002). Although other studies report a conception of learning such as growing as a person, no known studies report the conception of, “growing as a teacher” that was revealed in this study.

The study of geography through the construction of personal understanding is illustrated in the following response, “One of the best ways to learn geography is through observation and having students take notes and participate in hands-on activities.” This view of learning subject matter content through engagement is consistent with what was observed in Trigwell and Prosser (1991). This category also includes ETCs describing the use of text, video, artifacts, audio, and trips to “places” as a means of making the reading “come to life.” Demonstrating a more relational conception, an ETC described his/her

experience with learning geography as using place location and physical features and its affect on the residents' culture as an approach to understanding geography.

Some ETCs viewed learning geography as an opportunity for problem solving. Also some ETCs viewed problem solving as a requirement for learning geography. The distinction here is critical as the former conveys a deep conception of learning where the learner extends beyond facts and ideas to create new knowledge or extract new meaning. The later statement represents a more shallow or "surface" conception of learning as reproductive (i.e. the intention is just to cope with a task and reproduce the information unchanged) as was described by Entwistle et al. (2000). As a pedagogic structure, problem solving is generally referred to as "problem-based learning" (PBL). PBL is a constructivist learning approach that ETCs would be required to learn and understand in their previous educational coursework. PBL is considered one of the major categories of the inductive approaches to education and, as such, would normally receive explicit attention in their education coursework. As an example, ETCs describe learning geography through the use of authentic problem-solving approaches such as having the students "plan a vacation" or "determine the requirements necessary to travel to a specific destination." The responses belonging to this category also included several suggestions about the use of maps as tools of discovery.

The largest number of responses was categorized as learning geography as knowledge acquired from someone or something. Prominent in these responses was the notion of learning as simply an increase in information. There is very little explicit use of the term knowledge; however Bradbeer et al. reported that university students often used the terms information and knowledge interchangeably (2004). Responses in this category

contain terms or phrases that often use the words study or studied. For example, ETC responses in this category included “study places,” “study things like maps and globes,” “study maps” and “studied regions”. It also appeared that ETCs use the terms “learn about” and “study” interchangeably. The use of the terms “memorizes” or “memorization” emerged in this category. For example, an ETC’s comment on learning geography included “there is a great deal of memorization involved” in learning geography. Responses such as “reading textbook,” “studying map,” “taking notes,” “looking at pictures,” “completing puzzles,” “going over [P]owerpoints,” and “using an atlas and an almanac” all convey learning as increasing one’s knowledge rather than the constructing of understanding. The responses captured in this category were consistent with that observed by Bradbeer et al. in their study of undergraduates (2004). Bradbeer’s study viewed comments of the sort listed above as “learning as an increase in knowledge” and “learning as memorization for reproduction.” A most telling response of an ETC’s conception of learning geography was captured in the following statement, “I would approach the study of geography by memorizing facts that we were tested over. Creating acronyms for facts[.]”

Different from the various taxonomies of learning conceptions described in Chapter Two is the additional category added by Marton (1993). In Marton’s taxonomy, “growing or changing as a person” represents the highest level of learning conceptions. A participant’s response from this study illustrating this conception was “It would help me grow as a person[.] Plus when I become a teacher it will help me to teach these things to my students.” Given the focus of this study on the conceptions of ETCs, Marton’s sixth category was modified slightly to include growing or changing as a person or future

teacher. In Bradbeer's study of second and third year geography majors this conception "was not found among respondents in this study" (2004, 28). Bradbeer argued that the absence of this conception in his study and its presence in Marton's study was due to the nature of the participants in Marton's study, as well as the methods used to collect data. The study described in this dissertation would seem to support Bradbeer's claim. Its participants were ETCs representing a unique undergraduate population especially in terms of knowledge of pedagogy and application of constructivist approaches to learning. Bradbeer's participants were undergraduate geography majors. Second and third year geography majors are not likely to have been exposed to constructivist thinking explicitly or any teaching about pedagogy, thus providing a possible explanation for the absence of this conception in Bradbeer's study.

As discussed in Chapter Two, the construction of knowledge through social processes is a predominant component of contemporary educational philosophy. Conspicuous in its absence is any mention of social interaction as a conception of learning in the responses of ETCs. In this context social interaction refers only to types of interaction that support understanding. A study conducted by Koballa et al. demonstrated interaction between teacher and student as a conception of learning, however the nature of this interaction whether simply social conversation or learning task related are unclear (2000). Prior coursework in education should have exposed ETCs to a variety of cooperative and collaborative teaching and learning methods. There was no mention of these methods among participant responses. The absence of any mention of social constructivist methods in participant responses suggests a worthy topic for future research.

In addition to the framework question the research study proposed four subsidiary questions for which answers were sought. The first two of these questions were particular to the chosen methodology of phenomenography. The third question addressed whether the ETCs conceptions of geography revealed an understanding that was conceptually surface (shallow) or deep. The fourth subsidiary question examined whether or not ETCs viewed geography as a spatial problem solving framework.

5.3.3 Subsidiary Questions

What is the diversity of categorization of elementary teacher candidates' conceptions of geography?

ETCs in this study hold uncomplicated and limited conceptions of geography, and would have many conceptual deficiencies to overcome to meet the expectations of national policy agendas such as “No Child Left Behind.” The phenomenographic analysis used in this research study revealed only three categories of geography conceptions. The first two of these categories aligned with lower level cognitive skills and suggested the learning of knowledge for memorization long enough to reproduce on an assessment. The third category did include the concept of interactions which is a mid-level cognitive skill given its relational character.

Bradbeer et al. in their study of geography majors in their third and fourth years of undergraduate study, described five distinct categories, the last two of which are associated with higher level conceptions such as the study of spatial patterns and areal differentiation (2004). In comparison the ETC participants in this study made no mention of these conceptions.

Therefore, the findings of this research study support the conclusion that the ETC participants hold simplified conceptions of geography lacking the diversity necessary for serving as highly qualified teachers to their future learners. Given the unlikelihood of substantive changes in the elementary teacher education curriculum in the State of Texas, it is recommended that educators who work in preservice teacher education teach ETCs to confront their deficiencies and acquire the knowledge of geography necessary for effective lesson planning and teaching. The literature in K-12 science education is replete with studies that address how teachers can facilitate students' conceptual change. A model shown effective in moving students toward a scientific understanding of the world could prove useful in helping university teacher educators facilitate conceptual change among ETCs (NRC 2001). The conceptual change model is described by Yin et al. as a three part process (2008). Use of this model would require that the university teacher educator to implement the following: (1) identify students' current conceptions; (2) guide the students to realize the limitations of those conceptions; (3) guide the students to realize the universality of correct geographic conception. Steps (2) and (3) involve helping ETCs to see that their conceptions of geography do not support higher level thought processes, so that they realize their conceptual understanding is deficient.

What is the diversity of categorization of elementary teacher candidates' conceptions of learning geography?

Unlike their conceptions of geography itself, ETCs demonstrated a more diverse range of conceptions of the learning of geography. Additionally the conceptions of learning geography identified were more representative of higher order thinking skills. Of the four conceptions of learning geography identified, only one would be categorized as

the lower level such as knowledge of geography as acquired from someone or something. The other three conceptions of learning geography such as solving problems, construction of personal understanding, and growing as a person or future teacher are described in the literature as higher level. The category, learning as growing as a teacher, represented the highest level of learning conceptions as identified by Marton (1981).

The identification of the category “learning as growing as a teacher” is probably the result of the ETCs’ previous coursework and experiences in education. The conception of learning “as growing as a teacher” suggests a pedagogic readiness to effectively teach geography at the elementary level. However, the ETCs’ shallow or surface conceptions of geography would probably act as a barrier to effective lesson planning and teaching for their future learners.

Do elementary teacher candidates’ conceptions of geography reflect a deep or shallow understanding of core ideas and content?

The findings of this research study support the conclusion that the ETC participants in this study hold a shallow (or surface) conception of geography’s core ideas and content. As a collective whole, the responses show an emphasis on learning geographic information in isolation instead of attempting to understand spatial relationships. This makes clear the need for changes in the preservice curriculum that emphasizes the development of geographically-based questions, the collection of evidence to support geographically-based answers to these questions, and the evaluation of geographical information. Scant mention of maps, map making, map interpretation would also suggest that ETCs do not hold the conception of geography as the study of spatial arrangement.

A rather disturbing finding is the apparent confusion about the distinction between geology and geography. Further, responses by two participants indicate confusion about whether their prior university coursework was environmental science or geography. The lack of distinction is probably a carryover from conceptions they held prior to coming to the university. This lack of discipline coherence is similar to observations made by Gregg (2001). Thus, one can conclude that the ETCs K-12 education, as well as, any coursework taken at the university did not provide them with conceptions of geography that reflects a deep understanding of geography's core ideas and content.

Do elementary teacher candidates' conceptions of geography suggest the ability to teach their students to use geography as an analytic framework for understanding the people, places and environments of Earth?

Unfortunately the education provided to ETCs by the university used in this research study does not overlap well with the characteristics of a geography teacher described in the No Child Left Behind legislation (2008). However, there has been previous mention of the fact that the engagement of academic geographers bears little resemblance to what is taught in schools. The data provided in this study would indicate that the ETCs had not acquired a broad, deep, complex and integrated knowledge of geography. Additionally, they had not acquired the ability to *think geographically* which would have been evidenced by more prominent listing of the more interacting concepts of human systems and physical systems (Gregg 2001).

Given the shallow or surface conceptions of geography held by these preservice teachers, one would conclude that this sample of ETCs would be unable to teach their

future learners to use geography as an analytic framework for understanding the people, places, and environments of Earth. On the contrary, these ETCs are more likely to perpetuate the surface conceptions of “geography as memorization.” One might argue that the ETCs advanced knowledge of best practice pedagogy may impel them to look beyond their own surface conceptions of geography as they engage in lesson planning for their future learners. However, looking beyond their own surface conceptions would require a considerable commitment of time and energy as they try to obtain an understanding of geography as an analytic framework in order to be able to teach it as such to their future learners. Additionally, given the very low emphasis on social studies in the standardized assessment-driven environment of elementary education in Texas, it is unlikely that ETCs would make the necessary investment needed to obtain this understanding. Furthermore, there would be very little incentive for the school or district administration to expend resources to remediate the ETCs conceptual understanding of geography given the predominant emphasis on language arts and mathematics assessment in Texas public schools. Therefore, the findings of this study support the conclusion that ETCs graduating from this institution would not have the ability to teach geography as an analytic framework for understanding people, places, and environments of Earth. Thus, an important part of preservice teacher education should be to emphasize the use of this framework in the study of geography.

5.4 Contributions to the Literature

The research described in this dissertation, positioned as a baseline study, is limited in scope. However the findings do contribute to the knowledge base of preservice geography education. . Adding to this is the paucity of geography education research

situated in the EC-4 sector of education. There are many geography education studies published, however most of them are set in high school and university sectors of the education community. Drawing on the brain-based research of John Bransford and colleagues about how important conceptions of the world are formed in early childhood, more geography education studies need to be conducted involving EC-4 teachers and their students (Bransford et al. 1999). Downs champions the need for a new attitude towards geography education research along with a series of baseline studies “if we are to make a convincing case for geography in America’s schools” (1994, 57). Down’s article does not specify at what level or levels the need for these studies exists, however the majority of studies of the nature he describes in the article are at the high school and university level. Almost twenty years ago, Gardner decried the lack of educational research conducted at the elementary level and argued strongly for its need (1990). Research described in this study will make several contributions to preservice geography education. Bednarz and Bednarz in their introduction to the 1995 special edition of the *Journal of Geography* urge greater attention placed on the needs of preservice teachers as the geography education community responds to calls for reform (1995). The conceptions of geography revealed in this study will begin to provide useful information for the design of effective preservice geography education development opportunities.

Although there has been much greater emphasis placed on geography education research at the high school and university levels, this study is informed by select research conducted at the elementary level. In her study of preservice teachers at the beginning of their teacher education coursework, Gregg found that the minimal content knowledge of geography impaired their ability to plan effective lessons at the fourth grade level (2001).

In particular, her findings showed that, “these beginning teachers were twice as likely to mention a concept without elaboration than to explain or make connections between or among concepts” (2001, 64). As described earlier, the conceptions identified in this study were largely un-relational suggesting the probability of this same impairment by the ETCs participating in this study. Given the paucity of studies of geography learning at the preservice level, it could be instructive to discuss the findings of this study in the context of research conducted in other disciplines where there exists much research of this nature.

Parker and Heywood studied elementary preservice teachers’ conceptions of forces within the context of buoyancy finding that not only was their subject matter knowledge lacking so was their pedagogical content knowledge regarding forces (2000). In contrast to what Parker and Heywood observed, ETCs in this study did show a more sophisticated knowledge of pedagogy even though their conceptual knowledge was limited.

Noteworthy for this study is the finding of the conception of growing or changing as a teacher. This conception would indicate that the ETCs saw value or need of the knowledge not solely as personal but as necessary for effective teaching. A study of prospective gymnasium science teachers identified a teaching-specific conception of learning, however these individuals’ conceptions of learning science involved rote memorization and problem solving (Koballa et al. 2000). The teaching-specific conception was the need for teacher-student interaction, a conception not previously described in the literature.

Brownlee et al. investigated changes in preservice teachers’ conceptions of learning over the course of two semesters of coursework at the graduate level (2003).

These prospective teachers demonstrated a preference for a deep conception of learning at the beginning with little change over the year of the study. Although these individuals did not experience a significant change in their conceptions of learning, the study showed that deep learning became more predominant in their choice of approaches. The Brownlee study further argued that preservice teachers may hold multiple conceptions of learning simultaneously and changes in conceptions of learning may be more of change in focus rather than a shift from one conception to another. The diversity of conceptions of learning that emerged from this study might now be looked upon as a matter of focus or emphasis rather than categorically. Attempts to change these conceptions may be a matter of getting the ETCs to shift focus or emphasis rather than shift categories. For example, in a study of student teachers enrolled in an educational psychology course at a university in Queensland, Brownlee et al. observed that although these students were aware of more transformative learning approaches they did not identify them for use until the course assessment instruments required them to do so (2003). Research by Biggs also noted the use of assessment to shift the focus to transformative learning among preservice teachers who first engaged in more surface or shallow approaches (1996). Further study of the nature of changes in learning conceptions as focus shifts or category changes seems worthy of exploration.

5.5 Implications and Recommendations

The lessons learned from this study are noteworthy in several instances and provide useful insight into the education of ETCs who will be capable of teaching geography effectively. If the relationship between the understanding of content, knowledge of pedagogy, and the achievement of future learners follows what has been

observed in other science, technology, engineering and mathematics (STEM) disciplines, then the findings of this study should be viewed with much concern. In some STEM disciplines such as biology the amount of coursework had no affect on student learning. In others such as mathematics, research supports a threshold effect where there is minimal impact on student achievement beyond a certain number of undergraduate courses (Wilson et al. 2001). The presumption in these studies is that knowledge of concepts in the discipline correlates positively with affecting positive student learning outcomes. This study did ask the participants to reveal the number of geography courses taken previously. In some cases participants did reveal the nature of the courses taken, however some participants could not recall if the course they had taken was human, world, or physical geography in scope. Others indicated that they had taken undergraduate courses in geography but listed them as earth science or environmental science when asked to recall what geography courses they had taken. Given this apparent confusion of the nature of geography, one wonders whether these ETCs could plan and deliver effective lessons in geography. Table 9 presents thirteen contributions to the knowledge domain of geographic education that emerged from this research. The implications of these contributions are discussed later in this chapter.

Table 9. Summary of Contributions to the Academic Literature

Research Findings	Contributions to the Knowledge Base of Geographic Education
Three conceptions of geography	Contributions to the concept or experience of geography: <ul style="list-style-type: none"> • Geography as the study of places and people • Geography as the study of the world • Geography as the study of the world's interactions
Four conceptions of learning geography	Contributions to the concept or experience of learning geography: <ul style="list-style-type: none"> • Learning geography as knowledge acquired from someone or something • Learning geography as solving problems • Learning geography as construction of personal understanding • Learning geography as growing as a person or future teacher
Preservice teacher education	Contributions to preservice elementary teacher education: <ul style="list-style-type: none"> • Supports the need for courses that integrate subject matter knowledge with pedagogic content knowledge • Provides data for the design of future inservice training • Supports the effectiveness of teacher education program in terms of learning pedagogic knowledge.
The Experience of Phenomenography	Contributions to the study of geography education: <ul style="list-style-type: none"> • Can reveal conceptions of geographic phenomenon • Can reveal conceptions of learning geographic phenomenon • Can provide useful base line information to support further research

Important insight about ETCs content knowledge and understanding can be gained by analyzing their conceptions. The conceptions of geography these ETCs hold appears to be shallow, however their knowledge of effective pedagogy is advanced. Bednarz et al. cites research that demonstrates a positive relationship between student achievement and pedagogical content knowledge or specific knowledge of how to teach specific content effectively (2004).

As a framework for preservice teacher training, Shulman introduced a model referred to as Pedgogical Content Knowledge (PCK) (1986). Shulman's model combines the knowledge domains of pedagogy and content. Van Driel et al. describes PCK as "a way of understanding the complex relationship between teaching and content through the use of specific teaching approaches and is developed through an integrated process rooted in classroom practice" (1998, 677). Gess-Newsome and Lederman promoted the use of a PCK model for science education (1999). Brophy and Alleman promoted the critical role of the teacher in the development and deployment of activities that support meaningful learning experiences (1991). Underlying PCK is the awareness that the knowledge preservice teachers acquire in their content courses (such as geography) does not necessarily provide them with the understanding they need to transform academic knowledge into effective instructional activities (Van Driel et al. 1998).

Thus given what was revealed about ETCs high levels conceptions of learning geography a case could be made that they could possibly teach some components of geography effectively at the elementary level if they could apply their general knowledge of effective pedagogy to bolster their limited knowledge of the content of geography. However questions concerning the possible confusion among ETCs about the nature and

distinctions of the disciplines of geography, geology, earth science and environmental science and its probable negative impact on effective teaching should be addressed in future research.

Another implication of this research is that it reveals a shallow conception of geography. Based on constructivist thinking, this limited prior knowledge will affect the ETCs' ability to learn new information needed to teach geography effectively. Research conducted by Mestre and Cocking shows that when new knowledge conflicts with existing knowledge; "the new information will not make sense to the learner, and is often constructed (or accommodated) in ways that are not optimal for long-term recall or for application in problem-solving contexts." (2000, 20) Thus any preservice interventions aimed at advancing the knowledge and understanding of geography of ETCs must be designed to assess and then challenge these existing shallow conceptions of the discipline (Schauble 1990). Concomitantly, attention must be paid to the instructional strategies employed to advance ETCs knowledge and understanding so that they favor strategies that facilitate knowledge construction over expository teaching. Interventions employed to advance ETCs conceptions of geography must have the ETCs actively engaged in the construction of geographic knowledge if they are to effect meaningful change.

This research study also supports the need to incorporate the findings of brain-based research into how humans learn into the education of ETCs as the conceptions of geography and the conceptions of learning geography revealed in this study demonstrated little evidence that this has occurred. The following listing of ideas from brain-based research on how to educate ETCs is adapted from Mestre and Cocking (1999).

- Although the conceptions of learning geography are more advanced for ETCs than what was shown for geography majors, ETCs would greatly benefit from geography courses that integrate content with pedagogy. Geography's content and effective pedagogy for that content must be presented together.
- ETCs must do the learning of geography themselves. ETCs should be taught in learning environments that actively engage them in geography through methods such as inquiry, hands-on, cooperative group learning, use of technology, and presentations.
- Coursework designed for preservice teachers must teach fewer of geography's major topics in depth rather than the memorization of facts about many geography topics.
- Courses taken by ETCs must emphasize geography process knowledge. ETCs must understand how new geographic information is revealed so that they can teach their future learners these process skills.
- ETCs should be taught to apply geography's major concepts in multiple contexts in order to make knowledge fluid and to affect the transfer of knowledge. ETCs should be taught that in geography, a few concepts can be utilized in problem solving over a range of contexts.
- Teach ETCs how to help their future learners to organize geography's content knowledge in a hierarchy so that these learners can apply and flexibly use their knowledge across different contexts. A technique supported in the literature as effective for developing a hierarchical

structure as well as organizing knowledge into an efficient schema is concept mapping (Novak 1998).

- Teach ETCs to use metacognitive strategies to monitor their own progress in learning geography. Bransford et al. demonstrates that strategies that make learners self aware relate to the practice of self-regulating behaviors leading to understanding of content (1999).
- Teach ETCs how to monitor their future learners understanding of geography through the practice of formative assessment. ETCs must be taught specific techniques that allow them to monitor how their future learners are progressing in their understanding of geography's major concepts and processes.

5.5.1. Geographic Education Policy Implications

In this section, select implications of this research study and suggestions for recommended actions are described. Not intended to be a comprehensive listing, these recommendations address the following areas: (1) the training of university geography faculty; (2) the need for accountability in social studies education; (3) teacher education in general; (4) specific to the setting of this study; (5) possible focus of state alliances on elementary education; and, (6) the necessity to confront deficiencies and multiple understandings.

5.5.2 Awareness of University Geography Faculty

Faculty who teach undergraduate geography courses, particularly those courses taken as components in preservice elementary teacher education programs, should be made aware of, and, when possible, demonstrate brain-based instructional models in their

teaching. Undergraduate faculty in higher education should understand that effective content instruction requires knowledge of and implementation of effective pedagogy for that content.

5.5.3 Accountability in Social Studies Education

National organizations representing social studies constituencies should work to require accountability in social studies education at both the national and state level. In particular, these organizations should work to have social studies in general, and geography more specifically, held to the same testing standards as language arts, mathematics and science.

5.5.4 Teacher Education in General

The findings of this study demonstrate that teacher education programs are effective in teaching ETCs *how* to teach in general, but are not effective in teaching ETCs *what* geography to teach. Elementary teacher education programs should work to bring more balance between the content of geography and its pedagogy.

5.5.5 Setting Specific

The findings of this study point to the need for the university that served as the setting for this research study to reexamine how preservice elementary teachers are trained. Despite the lack of accountability in social studies education, this university should produce graduates who can teach social studies, in general, and specifically geography effectively.

5.5.6 Geographic Alliances

Given our understanding of how the human brain develops a person-specific framework for conceptual thinking early in a child's development, The National

Geographic Education Foundation and its network of state alliances should consider providing resources for effective teaching practice in geography education aimed specifically at preservice elementary teachers. Additionally, resources should be committed to the development of preschool programs that foster the development of accurate conceptual schema about geography.

5.5.7 Confront Deficiencies and Multiple Understandings

Faculty who teach science and social studies methods courses should understand (and teach accordingly) that ETCs have multiple understandings (geology, environmental science, and so forth) of the nature of geography. Elementary teacher education programs should teach ETCs to recognize and confront the conceptual (and content) deficiencies they have in geography.

5.6 The Experience of Phenomenographic Analysis

As the researcher who originated this study, I had no previous experience with the design of a study using phenomenographic analysis. Others involved in the analysis phases, such as Reviewer A and Reviewer B were also neophytes to this method. Additionally, I had no previous experience with research situated in the qualitative tradition. However, I was familiar with educational research in general, as well as, the academic literature on phenomenography. The choice of this methodology was not *a priori*. The design of the study emerged from an interest in conceptions of learning theory and its application to the learning of geography. Other approaches, both qualitative and quantitative have been used to explore questions related to conceptions of learning such as Grounded Theory, Dual Scaling analysis and the use of the Repertory Grid (Embacher and Buttle 1989; Nishigato 1994; Strauss and Corbin 1998). Given that no previous

conceptions of learning study had been conducted with ETCs I elected to first describe the diversity of categories of how these participants conceive of geography and the learning of geography. Based on a thorough review of the literature, the method of phenomenographic analysis was chosen due its ability to reveal these learning conceptions. My journey with the use of this method of analysis mirrors that of Drew et al. in their study of the learning of fashion design among students enrolled in four fashion design departments at universities in the United Kingdom (2001). In the Drew et al. study, none of the researchers in the study had previous experience with phenomenographic analysis. However, they support the position of Akerlind that the existing body of literature provides sufficient preparatory information for researchers utilizing the methodology for the first time (2005).

As I reflect on my experience with this method of analysis, several themes and observations emerge. First is the requirement of bracketing. Bracketing essentially refers to the suspension of one's own preconceived ideas and notions so that one can focus solely on describing the participant's experience of the phenomenon. The challenge was to describe the participant's own experience of geography rather than my own experience interacting with the participants. This was especially difficult because of my broad knowledge of the geography curriculum as well as my in-depth knowledge of effective pedagogy. My previous research experiences were strongly quantitative and so to eschew this thinking was very difficult. However, after many iterations of reviewing the data, along with the constant use of a focusing question, I began to see varied categories of conceptions emerge from the data. Secondly, it was very difficult for me to avoid assigning importance to the relative number of responses in each category.

Phenomenographic analysis attempts to describe the diversity of conceptions of the phenomenon held by a group of individuals. In the case of this research, responses from a large number of participants were considered fragments of a whole so that the number of participants espousing a diverse category is irrelevant. No category is any more robust or significant than the other; as such it was difficult for me not to want to attach importance to categories with greater frequencies. A third theme that emerged is the requirement to focus on the diversity of categories, therefore having to overlook items and statements that were the same over the range of participants' responses. I found this very challenging as my first inclination is to look for patterns of similarity across the data pool. A fourth observation concerns the requirement in phenomenographic analysis that you are not analyzing participant statements in the light of predetermined categories. This conflict arises because of my long professional history emphasizing the nature of causality. Successful phenomenographic analysis requires that one suspend cause and effect thinking and the experimental hypothesis generation that goes along with it. The research does not form testable hypotheses or generate a priori categories into which the data are categorized. A fifth and final observation stems from the accepted variation in phenomenographic practice. I discuss this in Chapter Two, however finding very few studies with detailed accounts of the data generation and analysis phases made deciding on the specific course for the data collection and analysis phases of this study difficult.

In closing, the use of phenomenographic analysis can be successful for researchers new to the method as long as one has spent enough time working through issues such as those described above. Given the wide latitude in the choice of data

collection methods, this approach could provide a very useful tool for the investigation of geography's skills, concepts, and themes.

Phenomenographic analysis is a versatile tool with potential application to studies of students, teachers, K-12 administrators, and university faculty. Hopefully the outcomes of these kinds of investigations would contribute in meaningful ways to the effective teaching and learning of geography.

5.7 A Final Statement

For effective geography education to ever reach where it matters, the elementary student, ETCs must be educated to create an environment that provides opportunities for their future learners to develop a deep understanding of geography's concepts, skills, and themes. The findings of this baseline study were analyzed to describe distinct variation in conceptions of geography and the learning of geography of a hierarchical nature that is consistent with the findings of the phenomenographic analysis of other phenomenon (Marton and Booth 1997). This variation in conceptions among ETCs has, to my knowledge, not been previously described.

The geography education literature is replete with studies that describe issues of a problematic nature. Very little research exists with respect to the geography education of preservice teachers at the elementary level. The study described here serves as baseline information on which to pursue more specific research questions, some of which are listed previously in this document. Libbee argued the need for addressing preservice teacher education on many fronts, the least of which is the requirement of additional content courses whose use of ineffective pedagogy promotes the status quo (1995).

Studies that examine the content knowledge of preservice elementary teachers tend to provide a weak or guarded picture. Unfortunately, it is at the pre-collegiate level, likely early elementary, that preservice teachers developed their conceptions of geography and the conceptions of learning geography. Given the state of geography education over the recent past, the findings of shallow conceptions of geography are not surprising. In closing, I will adapt an observation made by Simon in his phenomenographic analysis of preservice teachers' knowledge of division (1993).

In order to break the cycle of teachers with weak conceptual backgrounds, providing conceptually impoverished instruction, preservice geography courses will need to prepare prospective teachers more adequately. The view of ETCs knowledge provided by this research suggests the need for a geography education considerably different from what is currently available.

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APPENDIX A
PHASE TWO QUESTION PROMPT FORM

“An Investigation of Elementary Teacher Candidates’
Conceptions of Geography”

Invitation: Please participate in this educational research project.

Why: Your participation in this study will help us in further planning and evaluation of the methods courses taken in PDS I.

What: Respond in writing to two open-ended questions from your perspective as a preservice teacher.

How: Complete the following – (keep pages together; please do not remove the staple)

- (1) Read through these instructions.
- (2) Make up a “code” using your initials and the last three numbers of your phone number.
- (3) Read, sign and date the “Consent to Participate” form on the next page.

- (4) Complete the “Participant Information Form” on page 3 including your name and code.
- (5) Read and respond to the two Question Prompts on page 4.
- (6) Return to your instructor.

Thank You: Your participation is greatly appreciated!

APPENDIX B
PHASE ONE SURVEY INSTRUCTIONS

Survey Instructions

INSTRUCTIONS:

- ⊕ Please read and sign the *Consent to Participate form*. Be sure to print your name below your signature and fill in today's date.
- ⊕ Make up a code using the first 3 letters of your last name followed by the last three numbers of your student ID, or phone number or street address. Put this code in the space indicated on the top right of each page.
- ⊕ Complete the *Participant Information Form*.
- ⊕ Read the *Question Prompt Form*. Your responses can make a contribution to the improvement of geography learning so please write as much as you can.

Your participation is greatly appreciated!

Consent to Participate

Code: _____

“AN INVESTIGATION OF ELEMENTARY TEACHER CANDIDATES’ CONCEPTIONS OF GEOGRAPHY”

The following information is provided for you to decide whether you wish to participate in this study. You should be aware that you are free to decide not to participate or to withdraw at any time without affecting your relationship this department, the instructor or the University of North Texas.

The purpose of this study is to collect and categorize the diversity of conceptions that preservice elementary teachers have of geography. The procedure of the study will be qualitative constructivist/interpretivist design.

Data will be collected using open-ended questioning. Responses will be self-report and hand written on a form provided by the researcher. Individual face-to-face interviews may be made for follow-up and clarification purposes. Individuals involved in the data collection will be students currently placed in Elementary Education PDS I and PDS II cadres of the University of North Texas Teacher Education Program.

Do not hesitate to ask any questions about the study either before participating or during the time that you are participating. We would be happy to share the findings with you after the research is completed. However your name will not be associated with the research findings in any way. Your identity as a participant will only be known to the researchers.

There are no known risks and/or discomforts associated with this study.

The expected benefits associated with your participation are the information you gain about the qualitative research process, the opportunity to provide data that may lead to improved understanding of teaching using cartographic maps and a general crediting if aspects of the study is presented for publication.

APPENDIX C
INSTRUCTIONS FOR ANALYZING PHASE ONE DATA

Background

Phenomenography as a research methodology originated in the 1970's at the University of Göteborg, in Sweden. Initially it was described as a "research approach" due to its empirical basis rather than having the philosophical and ideological foundations of the related methodologies of ground theory and phenomenology. Phenomenography's ontological and epistemological bases as well as its theoretical position have been addressed in subsequent years. Most recently specifications for the requirements of accepted methodology have been published (Bowden and Walsh, 2000; Dall'Alba and Hasselgren, 1996; Marton and Booth, 1997). Despite this formalization, Phenomenographic practice remains quite varied due to a lack of methodological detail in published research using it as an analysis tool. A general lack of knowledge about the nature of Phenomenography further contributes to a body of misunderstandings regarding this research methodology.

Expected Outcomes

Marton describes Phenomenographic research as the search for variation in the awareness of, or ways of experiencing of, a phenomena (Marton 1981; Marton and Booth 1997). The expected outcome of the research is a set of qualitatively different meanings or ways

of experiencing the phenomenon referred to as “categories of description”. The description will also include the linking structural relationships existent among the categories. The categories of description, along with the linking relationships, describe an “outcome space” of different ways of experiencing a phenomenon that are logically related to each other due to the common experience of that phenomenon. A core assumption of Phenomenography is that the varied ways of experiencing a phenomenon are logically related to one another in a hierarchically inclusive manner. Given this assumption, the aim of the researcher is to uncover a logically inclusive structure of related meanings despite the fact that the same phenomenon may be understood differently by different people and under different circumstances (Akerlind, 2005).

Criteria

The quality of the Phenomenographic *outcome space is often judged using three criteria (Marton and Booth, 1997):

1. Each category of the outcome space reveal something distinctive about a way of understanding the phenomenon;
2. Categories are logically related, typically as a hierarchy of structurally inclusive relationships;
3. Observed outcomes are parsimonious; critical variation of the experience observed in the data is represented by a set of as few categories as possible.

* The set of categories/meanings are not determined in advance but must “emerge” from the data in its relationship with the researcher.

Of critical importance is that the researcher maintains an open mind during the data analysis. The researcher should try not to impose any preexisting views regarding the

categories of description as well as try not to come to rapid conclusions about the inclusion of certain categories. It is important that the researcher be open to altering his thinking given further discussion, new perspectives and personal reflection. Additionally, the researcher should consider the transcripts and their emerging categories of description as a closed set with focus on the collective experience, not on individual transcripts and categories.

Specific Instructions to the Reviewer

1. Although there are multiple individuals conducting reviews of the same sample, please work independently.
2. Read the entire set of transcripts 2 – 3 times before attempting to write down any categories; these early readings should be conducted with an attitude of openness; you should be reasonably familiar with the transcripts before the next step.
3. As you read the transcripts, the question in your mind should be: “What does this tell me about the way that geography is understood by this preservice teacher?”
4. Highlight relevant quotes and make written notations to help you identify specific ways that the participant has experienced the phenomenon.
5. As you read the transcripts begin to think about possible categories; search for qualitatively different ways the participants describe the phenomenon.
6. Begin to sort the transcripts into potential groups that represent key intra-group similarities and inter-group differences.
7. Using an iterative sorting process; review the categories against the set, adjust and re-adjust with each iteration in the process.
8. Continue until the whole system of meanings stabilizes.