

EXAMINING TEACHERS' ATTITUDES AND BELIEFS TOWARDS MESSAGES
FOR TEACHING GEOGRAPHY IN K-12 EDUCATION FROM
LEADERS IN GEOGRAPHIC EDUCATION

by

Matthew T. Patton, B.A, M.S.

A dissertation submitted to the Graduate Council of
Texas State University in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
with a Major in Geographic Education
December 2014

Committee Members:

R. Denise Blanchard, Chair

Richard G. Boehm

Yongmei Lu

Herb Broda

COPYRIGHT

by

Matthew Thomas Patton

2014

FAIR USE AND AUTHOR'S PERMISSION STATEMENT

Fair Use

This work is protected by the Copyright Laws of the United States (Public Law 94-553, section 107). Consistent with fair use as defined in the Copyright Laws, brief quotations from this material are allowed with proper acknowledgment. Use of this material for financial gain without the author's express written permission is not allowed.

Duplication Permission

As the copyright holder of this work I, Matthew T. Patton, authorize duplication of this work, in whole or in part, for educational or scholarly purposes only.

DEDICATION

I dedicate this dissertation to Thomas Aiden Eynon, who passed away shortly before it was completed. Aiden taught me the importance of perspective and what is truly important in life. I cannot wait to see that Lego mansion in the sky!

ACKNOWLEDGEMENTS

I would like to thank my advisor Dr. Denise Blanchard for all of her tireless efforts throughout the last few years. Life's many curveballs never got in the way of her taking the time to make sure I was on track and focused on completing this dissertation. Her drive to make me a better writer and a better researcher cannot be thanked enough.

I would also like to thank my dissertation committee, Drs. Richard Boehm, Yongmei Lu, and Herb Broda, for your continued support throughout my doctoral coursework and completion of this dissertation. Your instruction, knowledge, and friendship are invaluable. Encouragement was never lacking and every drop of it has always been appreciated deeply.

My thanks are extended to those teachers who participated in the study and even more thanks to those teachers who braved the phone interviews with me. Although anonymous in print, your personal commitment to this project will always be appreciated.

There are many colleagues who helped throughout the last four years. Adam Mathews, Matt Connolly, David Yelacic, Ryan Schuermann, and Elyse Zavar, each of you provided tremendous levels of support, whether it was as officemates or working through methodological issues, thank you for all of your friendship and time. Nick Stamper and Sam Perry, your friendship means the world to me. Our get-togethers always provided the necessary mental breaks from this dissertation.

Lastly, I want to thank my family. Uncle Jeff, you sparked my interest in geography at an early age and I am so thankful for that 3D relief map of the United

States. David, our conversations about careers in geography and academia were invaluable and cemented my career goals. No amount of thanks will ever be enough for all of the love and support from my Mom and Dad. You have been inspirations my entire life and continue to inspire me today. Mom and Dad Eynon, you welcomed me into the family with loving arms and that support has meant the world. Molly, Tyler, and Lacy, you have provided support in the way of laughter and fun times when they were needed most. I love you all! Most importantly, I thank my wife Lauren for always being there for me, through the good times and the bad times. Without your love and support, these acknowledgements, let alone this dissertation, could not have been written. I love you more and more!

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	v
LIST OF TABLES	x
LIST OF FIGURES	xiii
ABSTRACT	xv
CHAPTER	
1. INTRODUCTION	1
Problem Statement	2
What Constitutes a “Message” in this Research?	4
Defining a Process of Communication in K-12 Geographic Education	4
Hypotheses	8
Research Design: Brief Description	8
Scope of Study	9
Contribution to the Geographic Education Literature	10
2. THEORIZING A PROCESS OF COMMUNICATION IN MODERN GEOGRAPHIC EDUCATION	12
Message Characteristics	14
Receiver Characteristics	16
Summary of Literature	19
3. METHODOLOGY	21
Reintroduction of Study Questions	21
Description of Research Methodology	22
Phase One: Content Analysis of Geography Education Publications, Documents, and Events	22
Phase Two: Dissemination of an Online Survey to a Sample of Classroom Geography Teachers	23
Phase Three: Interviews of Classroom Geography Teachers	24

Summary of Phases.....	24
4. CONTENT ANALYSIS OF MESSAGE SOURCES AND CHARACTERISTICS	26
Early Messages in Geography Education	26
Guidelines for Geographic Education.....	26
Geography Education National Implementation Project	27
Geography Framework for the 1994 National Assessment of Educational Progress.....	28
Geography for Life	28
A Decade of Reform in Geographic Education	29
Rediscovering Geography.....	30
The First Assessment	31
Path Toward World Literacy	32
Learning to Think Spatially	32
Recent Messages in Geography Education.....	33
Geography for Life, National Geography Standards, Second Edition.....	33
Why Geography is Important.....	34
A Road Map for 21 st Century Geography Education.....	34
Messages Arising from Professional Conferences	35
Influences beyond Academia: Organizations for Geographic Education and their Messages.....	37
Technology’s Impact on Geography Education	38
5. DESCRIPTIVE DATA ANALYSIS	40
Exploratory Data Analysis – Descriptive Statistics	41
Model Component 1—“Hearing.” To what extent do classroom teachers of geography “hear” or learn about the teaching of geography in the classroom from leaders in higher education and/or the community of professional geographers? What are the sources of messages, and how frequently are they used.....	42
Model Component 2—“Understanding.” To what extent do classroom teachers of geography “understand” messages? Do other factors that are internal and external to the teacher (i.e., receiver characteristics) play a role?.....	52
Model Component 3—“Believing/Trust.” How much do classroom teachers of geography “believe,” or trust the information that they receive from leaders of geographic education?	58
Model Component 4—“Perceiving.” What is the degree to which classroom teachers “perceive” that messages from leaders in geographic	

education are relevant to their classroom teaching of geography? What is the extent to which teachers perceive that they must adopt and/or incorporate messages into their approaches to teaching?	63
Model Component 5—“Confirming.” This section examines whether colleagues influence their attitudes, beliefs, and perceptions of how to teach geography in the classroom (i.e., “confirmation”)	68
Model Component 6—“Acceptance/Acting.” What is the actual degree of acceptance of approaches and action to change ways to teach geography after “hearing” or learning new information disseminated from leaders in geographic education	69
Other Factors Reported by Teachers toward Acceptance and Action on Messages from Leaders in Geographic Education.....	74
6. EXPLORING RELATIONSHIPS AMONG THE COMPONENTS OF THE GEOGRAPHIC EDUCATION COMMUNICATION MODEL	81
Measures of Association – Chi-Square.....	81
“Hearing” and Results of Chi-Square Tests of Independence	83
“Acting” and Results of Chi-Square Tests of Independence	87
Defining a Model for “Hearing” and “Acting” – Linear Multiple Regression.....	90
Defining a Model for “Hearing” and “Acting” – Logistic Regression	93
7. QUALITATIVE ANALYSES FROM OPEN RESPONSES AND TEACHER INTERVIEWEES	98
Qualitative Results – Online Survey.....	98
Qualitative Results – Phone Interviews	106
Summary of Analysis.....	118
8. CONCLUSION.....	120
Summary of Results	120
Contribution to the Literature	124
APPENDIX SECTION	126
LITERATURE CITED	133

LIST OF TABLES

Table	Page
1.1. Timeline for Completion of Process of Communication Study.....	10
3.1. Phases, Methods, and Locations of Current Research.....	25
4.1. Phase 1: Content Analysis Major “Messages” in the Evolution of Modern Geographic Education.....	36
5.1. Relationship between Hypotheses and Online Survey Items	41
5.2. Familiarity with Messages from Leaders in Geographic Education.....	43
5.3. Importance of Sources for Awareness of Messages	46
5.4. Familiarity with Professional Organizations in Geographic Education	47
5.5. Importance of Sources for Course Development.....	50
5.6. Model Component 1 – “Hearing” Summary Table	52
5.7. Understandability of Messages	53
5.8. Applicability of Messages to State Standards.....	54
5.9. Organizations’ Awareness of State Standards	56
5.10. Model Component 2 – “Understanding” Summary Table.....	58
5.11. Teachers’ Trust of Messages	59
5.12. Teachers’ Membership in Professional Organizations	60
5.13. Teachers’ Trust of Organizations.....	61
5.14. Model Component 3 – “Believing/Trust” Summary Table	63
5.15. Organizations’ Effectiveness of Message Dissemination	64

5.16. Teachers’ Reliance on Organizations	65
5.17. Teachers’ Degree of Motivation to Incorporate Technology	66
5.18. Model Component 4 – “Perceiving” Summary Table	67
5.19. Model Component 5 – “Confirming” Summary Table.....	68
5.20. Teachers’ Frequency of Usage of Messages.....	70
5.21. Teachers’ Incorporation of Messages into Teaching	71
5.22. Teachers’ Incorporation of Organizations’ Messages	73
5.23. Model Component 6 – “Acceptance/Action” Summary Table.....	74
5.24. Teachers’ Years Teaching Geography Summary Table	75
5.25. Grades in which Teachers Teach Geography Courses	76
5.26. Geography Courses Taught by Teachers	77
6.1. Summary of Associations of “Hearing” ⁺ Messages and Components of the Education Communication Model for K-12 Geography Teachers	86
6.2. Summary of Associations of “Acting Upon” ⁺⁺ Messages and Components of the Education Communication Model for K-12 Geography Teachers	90
6.3. Predictive Model for “Hearing” Messages ^a Using Linear Multiple Regression	92
6.4. Logistic Regression Predicting Likelihood that Teachers are Familiar with Documents/Messages.....	95
6.5. Logistic Regression Predicting Likelihood of “Acting” as Defined by Incorporating Messages from Geographic Education Documents in Teaching	97
7.1. Familiarity with Other Geographic Education Publications.....	98
7.2. Extent to Which Teachers Use Sources beyond the Textbook.....	111
7.3. Extent to Which Other Teachers Use Sources beyond the Textbook.....	111

7.4. Extent to Which Teachers Use Sources beyond the Textbook114

LIST OF FIGURES

Figure	Page
1.1 Theorized Process of Communication between Information Disseminated by Geographic Education Leaders and Acceptance/Action by K-12 Classroom Teachers of Geography	7
5.1. Number of Teachers Familiar with Messages from Leaders in Geographic Education	44
5.2. Numbers of Documents Familiar to Teachers	45
5.3. Message Familiarity: Mean, Median, Mode	45
5.4. Importance of Sources for Awareness: Mean, Median, Mode	47
5.5. Number of Well-Known Geographic Education Organizations Familiar to Teachers	48
5.6. Organization Familiarity: Mean, Median, Mode	49
5.7. Importance of Message Sources for Course Development: Mean, Median, Mode	50
5.8. Message Understandability: Mean, Median, Mode	54
5.9. Message Application to State Standards: Mean, Median, Mode	55
5.10. Teachers' Belief Levels in Organizations' Awareness of State Standards: Mean, Median, Mode	57
5.11. Message Trust: Mean, Median, Mode	59
5.12. Teachers' Professional Organization Membership	60
5.13. Organization Trust: Mean, Median, Mode	62
5.14. Organizations' Message Dissemination Effectiveness: Mean, Median, Mode	64
5.15. Teachers' Reliance on Organizations: Mean, Median, Mode	66

5.16. Teachers' Confirmation of Messages: Mean, Median, Mode.....	69
5.17. Message Frequency of Use by Teachers: Mean, Median, Mode.....	70
5.18. Message Incorporation into Teaching: Mean, Median, Mode.....	72
5.19. Teachers' Incorporation of Organizations' Messages: Mean, Median, Mode.....	73
5.20. Years Teaching Geography: Mean, Median, Mode.....	75
5.21. Number of Geography Courses Taught	76
5.22. Teachers' Professional Development Attendance	77
5.23. Geography Teachers' Gender	78
5.24. Geography Teachers' Age Ranges.....	79
5.25. Teacher Willingness to Participate in a Phone Interview	79
7.1. Nodes Clustered by Word Similarity	118

ABSTRACT

Geographic education leadership includes members of academia, non-profit professional organizations, for-profit geographic and environmental companies, and the government. This leadership disseminates numerous messages to a variety of publics, one key public being K-12 geography teachers. These gatekeepers of geographic education messages disseminate said messages through formal and informal means. There is a lack of uniformity in the dissemination of these messages and often teachers are left unaware of new messages.

This dissertation examines the content of messages disseminated by professional organizations in geography during the modern era of geographic education (1984 to present). Additionally, it evaluates teacher responses to an online survey distributed to geography teachers in Texas and a voluntary subset of that group who participated in phone interviews elaborating upon answers provided in the online survey. A “Theorized Process of Communication between Information Disseminated by Geographic Education Leaders and Acceptance/Action by K-12 Classroom Teachers of Geography” was developed to serve as the theoretical framework for this study. From these analyses and the theoretical framework, six research objectives were addressed including (1) the extent to which teachers “hear” messages, (2) the degree to which teachers “understand” messages, (3) the degree to which teachers “believe” messages, (4) the degree to which teachers “perceive” messages to be relevant to their teaching, (5) the degree to which

teachers “confirm” messages with colleagues, and (6) the degree of “acceptance” of messages.

This study finds that some messages are heard more so than others. Some teachers passively seek messages while more teachers actively seek messages related to geographic education. Teachers report most messages are understandable and trustworthy. Findings also reveal some teachers are industrious in their efforts to improve their teaching, indicating they perceive change to be a good thing, while others are less than industrious in their efforts, content to maintain the status quo. Confirmation of messages is apparent as teachers share new messages with their colleagues. Teachers actions related to messages are mixed as they incorporate messages when possible, but also reveal long-term philosophical shift recommendations are beyond their control or are irrelevant to their day-to-day teaching. Lastly, this study provides introductory models aimed to predict more successful message dissemination and acceptance.

CHAPTER 1

INTRODUCTION

Kindergarten through grade twelve (K-12) geographic education leadership spans a multitude of individuals and organizations. Among the leaders are members of academia, non-profit professional organizations, for-profit geographic and environmental companies, and the government. This amalgam of geography education leadership comprises the influential leaders of K-12 geographic education policy and practice, and through formal and informal means, these individuals create a top-down, “gatekeeper effect” of messages and information for the practitioners—the classroom teachers—of K-12 geographic education.

Beginning with publication of the *Guidelines for Geographic Education, Elementary and Secondary Schools* in 1984 which ushered in “modern” geographic education, leaders asserted that K-12 teachers might well benefit from programs, materials, and guidance created and issued from scholars in higher education, as well as, professional practitioners to enhance the teaching of geography in the classroom. In particular, the geographic education leaders of the *Guidelines* era called for approaches to teaching geography that emphasized content, and, later, through the National Geography Standards Project, process. More recently, however, given advances in information and communication technology (ICT), information dissemination from leaders in geography education encompasses a paradigm shift away from late 20th century traditional approaches for geography teaching that address global content and natural processes to early 21st century instruction that facilitates the development of spatial thinking, especially through incorporation of technology in the classroom.

In diverse channels of communication, today's leaders call for research and produce reports that cite the need for this new paradigm shift. Publications from the 2013 Road Map for 21st Century Geography Education Project call for research oriented towards spatial learning and new methods for geography instruction so that today's students will become better prepared adult citizens, nationally and internationally, for a dynamic and rapidly changing world (Bednarz, Heffron, and Huynh 2013; Edelson, Shavelson, and Wertheim 2013; Elbow, Rutherford, and Shearer 2011; Heffron and Downs 2012; National Research Council 2006; Schell, Roth, and Mohan 2013).

Problem Statement

Classroom teachers across the United States are not a monolithic entity, and little is known about: 1) how they “hear” or learn about convincing arguments and information from influential academic, government, and business/professional leaders in geographic education, 2) what teachers “believe” about the veracity and viability of ideas and approaches recommended by these leaders, 3) whether teachers “understand” and information and recommendations disseminated from university scholars and other “professional” educators, and 4) whether this information becomes salient to classroom teachers to the point where they may, or may not, accept and implement the messages presented by geographic education leaders. In short, there is a paucity of research that addresses the extent to which K-12 teachers know about (have “heard”), and are willing to undertake (“to accept and act upon”) information dissemination from scholars and professionals in “higher” levels of geography education. . This research proposes that actions by teachers in relationship to the messages put forth by geographic education leaders are likely to vary considerably, across scales, and at all demographic levels – and,

for credible and viable reasons such as, the need to adopt a traditional approach to teaching geography, whether to incorporate more technology in the classroom for teaching spatial thinking, or how much time and resources to invest in teaching map knowledge and skills. In sum, almost no research exists that addresses the extent to which classroom geography teachers “hear,” “understand,” and then “believe,” or internalize these messages from information disseminated by leaders in geography education regarding lesson planning and curriculum. Few studies report teachers’ perceptions of, and/or attitudes toward, publications (i.e., “messages”) that concern the teaching of geography and whether this information has assisted them in the classroom. Lastly, scant research exists regarding the topic of “message” acceptance on the part of teachers, especially messages that address whether they should adopt new approaches that emphasize spatial thinking skills and learning based on scientific research and technology after hearing messages from influentials in geographic education (Baker 2005; Bowman, Kilian-Smith, and Brown 2005; Donaldson 2000; Kerski 2003; Patterson 2007; Schultz, Kerski, and Patterson 2008).

Thus, the goal of this research is to fill the gap that exists in the K-12 geographic education literature concerning the extent to which teachers are “hearing” or learning about messages that refer to all aspects of geography teaching, and, if so, how do they act—that is, what approaches—from traditional to technological—do teachers feel that they must support and utilize. In other words, what is the extent to which geography teachers “hear” of, or know about, these approaches through information dissemination; what are their attitudes, and beliefs toward hearing information about different approaches; how do they perceive the usefulness and relevancy of information about

different approaches, and, finally, to what extent do teachers say that they will act upon messages and incorporate information into teaching geography?

What Constitutes a “Message” in this Research?

Over the past four decades, the primary sources of information, instruction, guidance, and advice for K-12 geography teachers have been in the form of print publications, documents, books, monographs, and pamphlets, as well as, auxiliary materials in print format for classroom use, such as lesson plans. In recent years, these major sources of “messages” have appeared on the Internet at websites such as the National Council for Geographic Education (NCGE) and the National Geographic Society (NGS). However, for the purposes of this research, only the major publications in print format disseminated by leaders in geographic education will be referred to as “messages,” as one might consider these publications to be at the apex of geographic education since they have been created, researched, written, and disseminated by committees and individuals from leading academic and professional institutions. Examples of these publications include: *Guidelines for Geographic Education*, *Geography for Life*, and *A Road map for 21st Century Education*. A subsequent chapter (Chapter 4) provides a content analysis of the messages that emanate from each of the leading publications in geographic education.

Defining a Process of Communication in K-12 Geographic Education

Therefore, this research explores the extent to which “messages” of information and research, recommended and/or disseminated by influential leaders in geographic education that relate to information for teaching, not only spatial learning skills, but

geography as a whole, including new “tools” for geo-technology in the classroom, are *heard, understood, believed, confirmed, and acted upon* by classroom teachers of geography. This research combines research in two subdisciplines—K-12 geographic education and education communication to establish the foundation of this research. The K-12 literature in geographic education establishes information dissemination that addresses the “old” and the “new”—publications that span decades of traditional approaches to the new paradigm shift in spatial thinking and learning and technology adoption in the classroom while the education communication literature provides a process model for understanding the extent to which teachers “hear” or receive messages and then, whether this information influences teachers’ beliefs, attitudes, perceptions, and actions toward adopting what they have “hear” about concerning the teaching of classroom geography.

From these literatures, a “theoretical model of communication in K-12 geography education” has been proposed that conceptualizes this research.. This model appears in Figure 1 below and investigates:

- 1) the extent to which classroom teachers of geography “hear” or learn about the teaching of geography in the classroom from leaders in higher education and/or the community of professional geographers (hereafter referred to as “leaders in geographic education”);
- 2) the degree to which classroom teachers of geography “understand” the information that they receive or “hear” about—where the topics span a continuum from technology usage for developing map skills, spatial skills, and knowledge to the use of more traditional tools, such as textbooks and hard copy static maps;
- 3) the degree to which classroom teachers of geography “believe,” or trust the information that they receive from leaders geographic education especially, the efficacy of its use;

- 4) the degree to which classroom teachers “perceive” that messages from leaders in geographic education are relevant to their classroom teaching of geography to the extent that they must adopt and/or incorporate messages into their approaches to teaching?
- 5) whether their colleagues influence their attitudes, beliefs, and perceptions of how to teach geography in the classroom (i.e., “confirmation”); and,
- 6) the actual degree of acceptance of approaches and action to change ways to teach geography after “hearing” or learning new information dissemination from leaders in geographic education.

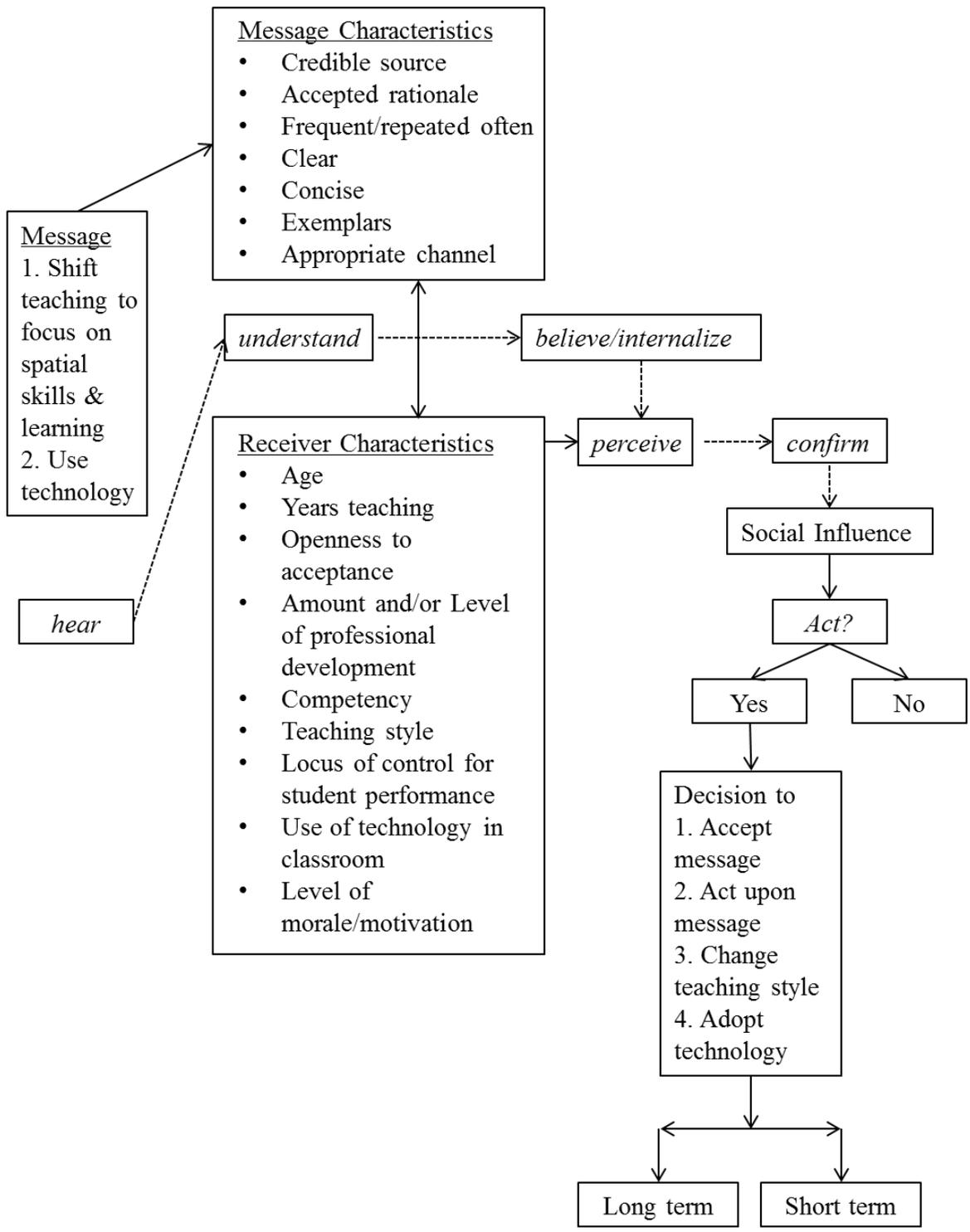


Figure 1.1. Theorized Process of Communication between Information Disseminated by Geographic Education Leaders and Acceptance/Action by K-12 Classroom Teachers of Geography

Hypotheses

The previous section established six basic study questions. Each is comprised of an underlying hypothesis to be tested within the precepts of the Geographic Education Communication Model as follows:

- 1) that teachers “hear” messages or learn of ways to teach geography but that the information emanates from diverse sources on a wide range of approaches and methods;
- 2) that teachers “understand” the messages but, that other factors, internal and external to the teacher (i.e., receiver characteristics) also play a vital role;
- 3) that teachers have different levels of beliefs, or trust, in messages received from geographic education leaders, due to their own personal attitudes and beliefs toward the teaching of geography in the classroom;
- 4) that teachers’ perceptions of the relevancy of messages to their teaching will affect the degree to which they adopt/adapt messages in their teaching of geography;
- 5) that teachers discuss such messages, or confirm with colleagues, in their decisions to act/adopt methods, approaches, and technology usage for spatial thinking in their teaching of geography; and,
- 6) that teachers may, or may not, act upon messages disseminated by influential leaders in geography education; but, if they do, there will be a range of choices in what to adopt/incorporate into their teaching as a result of messages.

Research Design: Brief Description

This research employed a three-phase, sequential mixed methods approach. Phase 1 consisted of identifying “messages,” formal and informal, that have been disseminated to teachers such as through workshops, conference presentation, professional development, journals, and other major geographic education research works that promote new directions and approaches to classroom instruction. A content analysis was performed to establish the type of information included in the message as well as the

message, itself, and whether it reflected the elements of an effective message (i.e., from a credible source, repeated frequently, clear, concise, etc.).

Phase 2 called for the development of an online survey, using *Qualtrics*, to a sample of about 1,500 classroom geography teachers who participate in the Texas Alliance for Geographic Education (TAGE). The structure of the survey questionnaire reflected the components—hearing, understanding, believing, confirming and acting—of the education communication model defined above so that predictions and relationships could be tested statistically. In Phase 3, a qualitative analysis was performed from in-depth interviews with a sample of thirteen teachers who participated in the quantitative survey and who agreed to share more information about their experiences with top-down messages and message dissemination, whether they agree to adopt new methods of instruction, or not, and challenges that relate to receipt and implementation of messages.

Scope of Study

As discussed in the previous sections, this study aimed to contribute to the understanding of the process of communication from leaders in geography education to K-12 classroom geography teachers among Texas geography teachers. In other words, what happens when geography teachers encounter geographic education messages disseminated from influential leaders in the academic, government, and business arenas. Despite decades of professional development for teachers, specific data demonstrates Texas K-12 students have performed poorly on standardized geography tests (Texas Education Agency 2013). Such messages, disseminated top-down from leaders in geographic education, exist, yet limited research identifies to what extent these messages have impacted the individual classroom.

This research focuses on the level of impact of leaders in geographic education, and the strength of the connection that classroom teachers have to those leaders when new information is disseminated. It is especially relevant in more recent decades given information disseminated that encourages a new paradigm shift away from traditional content teaching of geography to spatial thinking and learning using ICT technology. This research seeks to gain insight on the extent to which teachers pay attention to, or believe, significant “messages,” such as those produced by the flagship National Geography Standards Project, and whether teachers have incorporated information disseminated by influential leaders into their own classroom practices, especially concerning spatial thinking, learning, and technology skills. In sum, this research attempted to understand the attitudes, beliefs and opinions that teachers have toward these sources of information and whether they perceive that they should follow the guidance and advice from influential leaders who have decreed the new paradigm shift in how to teach K-12 geography.

The table below represents the timeline followed for this research.

Table 1.1. Timeline for Completion of Process of Communication Study

Stage	Task	Completion
1	IRB approval	Fall 2013
2	Quantitative survey	Winter 2013-14
3	Data analysis	Winter 2013-14
4	Qualitative survey	Spring 2014
5	Completion	Summer 2014

Contribution to the Geographic Education Literature

The K-12 geographic education literature is rife with top-down research on what “should” be taught in the geography classroom, as well as, “how” it needs to be done.

Only since the turn of the 21st century have we looked at whether, or not, teachers have adopted new paradigms and new methods that are heavy on ICT – and why, or why not?

This research differs from recent studies that focus on classroom teaching, in that it focuses on what teachers “hear” or how they learn about new methods, and approaches, and then whether they are motivated, or persuaded, to “do” anything about it.

Thus, findings will demonstrate the extent to which classroom teachers of geography receive messages from leaders of geographic education, what they think about it, whether they think that it is important enough to incorporate into their value systems (i.e., whether they internalize the information and make it salient), and then choose to act upon those messages, or not. This research will also demonstrate the strength and efficacy of information and research disseminated by influential leaders external to the classroom on the perceptions, attitudes, and actions of classroom teachers regarding their actual preferences in their approaches to teaching geography, spatial skills, as well as their preferences related to teaching “tools” – traditional or technological – to enhance classroom learning.

CHAPTER 2

THEORIZING A PROCESS OF COMMUNICATION IN MODERN GEOGRAPHIC EDUCATION

The theoretical framework for this research originates from a branch of mass communication research referred to as *persuasion theory*. It was developed by Carl Hovland and associates from the Yale School of Mass Communication in the 1950s and is considered “classic” research in that the principles established by the Yale School that define a process of communication—how a message is received, and whether it is acted upon—has not only remained steadfast over time, but also has been adopted and adapted by a multitude of researchers from other disciplines. The Hovland group first established that beliefs remain unchanged unless the individual encounters a new learning experience (Hovland, Janis, and Kelley 1953). Additionally, people hold beliefs when they observe that those beliefs can be validated (Festinger 1950). Social psychologists Petty and Cacioppo (1986) write that despite the belief that people want to hold correct attitudes, people do not always have the ability to analyze messages fully due to a number of individual and situational factors. This ability varies greatly from one individual to the next. The Yale Model, focuses on the extent to which someone will be persuaded, and is dependent on: 1) *attention* to the persuasive message, 2) *comprehension* of its content, 3) *acceptance* of, or yielding to, what is comprehended, 4) *retention* of the position agreed to, and 5) *action* in accordance with the retained agreement (Smith 1982). The Yale Model emphasizes the motivation factors impacting acceptance of the message being disseminated (Smith 1982). Expanding upon Hovland *et al.*, Larson (1992) states that persuasive arguments are dependent on five sequential steps: attention, comprehension,

acceptance, recall, and action. This indicates that any amount of one-way communication, such as message dissemination, involves a number of variables.

New learning experiences can range from interpersonal communications to recommendations made by leaders in geographic education. The experience, while important, is secondary to the degree of persuasiveness. Persuasiveness is impacted by a number of variables: the communicator, the content of the communication, audience predispositions, and responses (Hovland, Janis, and Kelley 1953). McGuire (1978) has defined a process of persuasive communication as: source, message, channel, receiver, and destination as pertinent variables (Pornpitakpan 2006), while Greenwald (1968) states that when a “person receives a communication and is faced with the decision of accepting or rejecting the persuasion, he may be expected to attempt to relate the new information to his existing attitudes, knowledge, feelings, etc. In the course of doing this, he likely rehearses substantial cognitive content beyond that of the persuasive message itself” (149).

The strength of the persuasion, or the effectiveness, therefore, is dependent on four factors: 1) source of new information, 2) perceived strength and believability of the message’s arguments, 3) choice of channel medium, and 4) receivers’ characters including, but not limited to, initial attitudes, ego, and personality (Smith 1982). As such, there are a number of factors that can impact the messages being disseminated by leaders of geographic information. These factors, starting with message characteristics are explained.

Message Characteristics

Message characteristics focus on content, style, channel, frequency, and source (Mileti and Soresen 1990). Content, stated simply, refers to the subject matter being disseminated. In the case of this research, content focuses on traditional content and styles of teaching geography, as well as, the more recent STEM-paradigm in geographic education with its emphasis on spatial thinking and learning as well as how such skills should be incorporated into the curriculum; and, finally, how they should be taught. Content also includes the source or sources of the message. This research highlights traditional content as well as information and messages about new approaches being disseminated by national and regional organizations (AAG, AGS, GCGE, NCGE, NGS)—organizations with long histories of supporting the advancement of geographic education in all ways possible. Quality content provides recommendations for actions to take by those receiving the messages (Mileti and Sorensen 1990). Not only do the aforementioned leaders in geographic education, those national and regional organizations dedicated to the advancement of geographic education, provide the latest innovations in instructional topics, they also provide the most up to date instructional techniques along with the means to execute such recommendations.

Style encompasses specificity, accuracy, consistency, certainty, and clarity (Mileti and Soresen 1990). For example, the organization's message that relate to spatial thinking and learning, and teaching new skills must also develop pedagogic techniques that are specific, accurate, consistent, certain, and clear to connect with the intended audiences. *Consistency* of a message has internal and external implications. Each leader or organization in geographic education must be consistent with its own messages.

Additionally, to be as useful as possible, consistency among all involved geographic education organizations is critical. While the unique messages do not have to be identical, those concerned with the advancement of spatial thinking, map skills, and incorporation of technology for geography teaching should, at the very least, be similar. Consistency reinforces the importance of the messages (Mileti and Sorensen 1990). *Certainty* indicates the conviction behind the message.

The *channels* in which geographic education messages are disseminated are numerous but mainly include publications (hard copy and electronic), professional development/workshop materials, and presentations at conferences. These channels represent a number of ways in which K-12 teachers have opportunities to “hear” diverse messages being disseminated from diverse sources of leadership in geographic education. It is also important to note that increasing the number of channels in which messages are disseminated also increases the likelihood that messages will be “heard” by the intended audiences (Larson 1992; Smith 1982; Turner, Nigg, Paz, and Young 1981). Channels of communication can be formal and informal and it is important to recognize that audio-visual channels result in more persuasive messages (Smith 1982); however, written channels of communication prove to be more effective and persuasive when the message is complex (Chaiken and Eagly 1976).

The *frequency* of the messages is also critical with respect to persuasion. Classic studies in persuasion theory demonstrate that messages disseminated repetitively, initially, reach their audiences with positive results (Berlyne 1970; Stang 1975) and more recently studies confirm such findings (Galak, Kruger, and Loewenstein 2011; Sheldon and Lyubomirsky 2012). Target audiences are able to learn something new and generally

have a positive attitude towards such information. However, as time continues and the messages continue to be repeated, audiences do become bored or satiated with messages and ultimately, begin to reject the messages (Smith 1982). In addition to how often messages are disseminated, the *pattern* in which messages are delivered can be predictable and, once again, audiences may become satiated with such messages (Smith 1982).

The last message characteristic relates to the *attributes of the source*. These include credibility, familiarity, and the official nature of the source. In simple terms, audiences want to know that they can trust the message they are receiving. If the source is *official* (i.e., from government agencies or professional organizations), if the source is *credible*, and if the audience is *familiar* with the source, the message will be viewed positively, and will, ultimately, have a longer lasting impact (Hovland and Weiss 1951; Pornpitakpan 2004; Smith 1982). Each of the message characteristics impacts how messages are received. Accordingly, such characteristics are addressed in this study.

Receiver Characteristics

Conventional wisdom argues that receivers of messages possess limitless characteristics. Accordingly, this study is dedicated to expanding on a finite number of such characteristics that have been identified in previous literature as pertinent in regards to receipt of disseminated messages. These characteristics relate to K-12 teachers and include: age, number of years teaching, openness to acceptance, amount and/or level of professional development, competency, teaching style, locus of control for student performance, use of technology in the classroom, and level of morale/motivation. Personality traits are critical to persuasion and attitude change. Ego can play a significant

role in the willingness of the audience to accept the message being disseminated (Petty and Briñol 2010; Petty and Cacioppo 1986; Petty and Cacioppo 1979; Smith 1982).

Teacher's *age* and the *number of years spent teaching* have been found to be determining factors impacting the willingness to listen to, understand, and accept a disseminated message (Hadley and Sheingold 1993; Marcinkiewicz 1995). Openness to *acceptance*, or the willingness to embrace a change in teaching style, has been shown to be an important variable in the message acceptance equation (Ely 1999; Ertmer and Ottenbein-Heftwich 2010; Hadley and Sheingold 1993; Marcinkiewicz 1995; Vannatta and Fordham 2004). Teaching style has also been found to impact the receptiveness towards new messages being disseminated in regards to *technology* (Briscoe 1991; Ertmer and Ottenbreit-Leftwich 2010). Marcinkiewicz (1995) found that *locus of control* for student performance was an important factor in the receipt and understanding of messages.

Competency is critical to understanding the receipt of messages. While recognizing that the implementation and integration of technology is a slow process (Ertmer, Gopalakrishnan, and Ross 2000; Levin and Wadmany 2008), such implementation and integration is further slowed by teachers' lack of technological competency (Baylor and Ritchie 2002; Eteokleous 2008; Russell, Bebell, O'Dwyer, and O'Connor 2003). Additionally, many teachers do not have adequate content knowledge related to geography (Anderson and Leinhardt 2002; Boehm, Brierley, and Sharma 1994; Reinfried 2006; Segall and Helfenbein 2008).

The amount and levels of *professional development* are critical to the receipt and understanding of disseminated messages. The literature regarding the professional

development of teachers related to technology usage and implementation is extensive. Currently, professional development recommendations include a blend of content knowledge, pedagogical content knowledge, and technology knowledge (Schell, Roth, and Mohan 2013). Technologies specific to geography (i.e., GIS) require focused professional development (Baker, Palmer, and Kerski 2009). Comprehensive, engaging professional development programs have produced results indicating short term and long term use of technology (Gerard, Varma, Corliss, and Linn 2011). Research is also demonstrating the changing pre-service attitudes towards geospatial technology as it is being introduced as part of the requirements for teacher education programs (Hauselt and Helzer 2012). Understanding the amount and/or level of professional development amongst Texas K-12 geography teachers can help to explain the receipt and understanding of messages disseminated by leaders in geographic education.

The use of technology in the classroom is an interesting case. The public at large has conveyed to school boards across the country that technology is important and should play an integral role in the classroom (Pearson and Young 2002). Despite this consensus of the public and policy makers, technology, while present in the classroom, is often left unused (Cuban, Kirkpatrick, and Craig 2001). Accordingly, it is vital to understand how technology is used in the classroom in Texas. Lastly, the *level of morale/motivation*, which may explain the use or lack of use of technology, needs to be investigated. Researchers demonstrate that motivation by either internal or external forces is important to understanding the receipt of messages (Ely 1999; Hadley and Sheingold 1993; Inan and Lowther 2010; Marcinkiewicz 1995).

Thus, while this study defines a one-way flow, or process, of communication, communication is not contained in a vacuum. The discourse on feedback effects is beyond the scope of this study; however, it is important to acknowledge the circularity of communication; the publics and counter-publics that exist in communication (Warner 2002).

Summary of Literature

This education communication framework encompasses an understanding of persuasive communication in which message characteristics such as content, style, channel, frequency, and source impact the message being disseminated. It also includes receiver characteristics which include age, years teaching, openness to acceptance, professional development, competency, teaching style, locus of control, use of technology in the classroom, and motivation. The combination of message and receiver characteristics is crucial to determining the perception of the messages disseminated. Successful receipt of messages can lead to confirmation through social influence, whereby those receivers of the message who understand the message, who believe in the message and internalize the message, act upon the message by continuing to disseminate it to colleagues. Actions also include the decision to accept the message, change one's teaching style, and adopting technology, in both short and long term settings.

The combination of message characteristics and receiver characteristics also serves as the basis for statistical testing in this study. A comparison of the individual components of message and receiver will provide insights into what K-12 geography teachers "hear," "understand," "believe," "perceive" and "confirm," as well as, their

willingness to act upon, or adopt new ideas and/or methods for teaching geography in the classroom.

CHAPTER 3

METHODOLOGY

Reintroduction of Study Questions

In the Introduction (Chapter 1), a conceptual model of geography education communication was presented that theorized a process by which classroom teachers of geography in K-12 education “hear,” or receive, information, instruction, and advice (i.e., “messages”) from geographic leaders; whether they “understand” the focus of messages; the extent to which they “believe” in the veracity and viability of the messages; whether they perceive that that the messages are relevant to their teaching; do they confirm messages with colleagues; and, finally, do teachers accept and act upon the messages. Thus, this research examined the extent to which teachers receive information from sources in higher education and the professional geographic education community, and then what process might they undergo that determines whether they act upon the information, or not. Thus, this research asked the following questions (re-phrased from Chapter 1):

- 1) How do teachers go about learning what to teach in the classroom?
- 2) What sources do teachers reach for, and trust the most?
- 3) Do teachers’ backgrounds play a role in message acceptance?
- 4) What are teachers’ attitudes and opinions of messages?
- 5) Do teachers confirm messages (through further dissemination to colleagues)?
- 6) What are the types of actions that teachers engage in upon the receipt of messages?

These questions relate to six basic hypotheses derived from the communication model presented in Figure 1 above:

- 1) that teachers “hear” messages but that the messages emanate from diverse sources, with varied and changing agendas which, in turn, contributes to diverse (and/or inconsistent) messages across sources;
- 2) that there will be different levels of teachers’ “understanding” of the messages as well as reasons underlying messages;
- 3) that there will be different levels of teachers’ “believability” of the messages depending on the credibility of the sources;
- 4) that teachers might be cautiously receptive, or have different levels of individual “perceptions” of the relevancy of the messages;
- 5) that teachers will discuss, or “confirm” messages with colleagues; and,
- 6) that teachers may, or may not, choose to “act upon” message dissemination by leaders in geographic education.

Description of Research Methodology

The purpose of this three-phase, sequential mixed methods study was to analyze characteristics of messages disseminated by leaders in geographic education as well as characteristics of intended receivers of those messages. Sequential mixed methods involve procedures in which the “researcher seeks to elaborate on or expand on the findings of one method with another” (Creswell 2009, 234).

Phase One: Content Analysis of Geography Education Publications, Documents, and

Events

In the first phase, a content analysis of geographic education messages was completed where content analysis refers to “any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core

consistencies and meanings” (Patton 2002, p. 453). The messages being disseminated by leaders in geographic education included major publications, documents and events listed in Figure 1, as well as, other means of informal dissemination. These messages were analyzed to recognize any patterns or themes that emerged, and then categorized into appropriate, discernible themes. The content analysis began with a search of themes that spanned a continuum of geography teaching from the traditional classroom focus on learning content information on world regions to the more recent emphasis on spatial learning skills and the instruction of spatial learning skills through the use of technology. Thus, the middle of this imagined continuum would represent teaching approaches that include textbook content, but also incorporate spatial learning, for example, by using internet map websites.

Phase Two: Dissemination of an Online Survey to a Sample of Classroom Geography Teachers

The second phase involved a quantitative online survey, using *Qualtrics*, distributed to a sample of about 1,500 classroom geography teachers who were members of the Texas Alliance for Geographic Education (TAGE). The decision to use TAGE as the survey population was grounded in the belief that members of TAGE might be more inclined to be invested in geography in Texas. While members of TAGE did not represent the entirety of geography teachers in Texas, they did represent a subset of this population who have shown a greater interest in geography and, therefore, were more likely to have more experience and knowledge with the receipt of messages disseminated by leaders in geographic education, at local, regional, and national levels.

The survey questionnaire was based on the education communication model included in Figure 1 that theorized a process of communication by which teachers “hear” or receive messages, and, then, ultimately, determine whether they are persuaded to act upon the messages. The questions that guided this study and subsequent hypotheses reflected the components of the education communication model. A focus group of area high school classroom geography teachers provided feedback and suggestions regarding the clarity and understandability of survey questions.

Phase Three: Interviews of Classroom Geography Teachers

The third phase of this study involved qualitative interviews of classroom teachers of geography. The survey instrument used in Phase Two included a question asking participants if they would be willing to participate in an interview with the researcher. A small group of thirteen teachers were selected from those survey participants who were interesting in participating. This phase was designed to flesh out significant quantitative results by exploring aspects of the communication model in greater detail. In addition, the online survey questions were expanded upon and investigated in more depth. This follow up phase was necessary as it allowed the researcher to better understand and explain the quantitative results.

Summary of Phases

Table 3.1 lists locations for the phases of the study. The first phase is not location specific. It involved the researcher analyzing geographic education documents and did not need a fixed location. The second phase features the quantitative survey, which was

distributed online through *Qualtrics*. The third phase, the qualitative interview segment, was not location specific either.

Table 3.1. Phases, Methods, and Locations of Current Research

Phase	Method	Location(s)
1	Content analysis	N/A
2	Quantitative survey	Online
3	Qualitative interviews	N/A

CHAPTER 4

CONTENT ANALYSIS OF MESSAGE SOURCES AND CHARACTERISTICS

This chapter presents the analysis from Phase 1 of this research which examined a number of prominent documents and publications, as well as, events that disseminated “messages”—information, instruction, advice, and so forth—over the past four decades comprising the modern era of geographic education in the United States. A description and analysis of each major document’s intent, purpose, and message of each document and event are presented below. The message sections include general messages concerning deficiencies, reform and, directions in geographic education from leaders in geographic education. For teachers, early messages addressed content and instructions for teaching geography employing traditional teaching approaches, and, in more recent times, messages emphasize the importance of developing spatial thinking in students, and incorporating technology in the classroom to enhance this direction.

Early Messages in Geography Education

Guidelines for Geographic Education

The modern era of geographic education began in 1984. That seminal year marked the introduction of the Five Fundamental Themes (Location, Place, Human-Environment Interaction, Movement, and Regions). The Five Fundamental Themes were included in the *Guidelines for Geographic Education: Elementary and Secondary Schools* (Natoli et al. 1984). This joint effort between the Association of American Geographers (AAG) and the National Council for Geographic Education (NCGE)

recommended influencing standards, improving teacher expertise, setting up communication networks, increasing the visibility of geography, and improving teaching and learning materials (Natoli et al. 1984; Natoli 1994). For much of the 20th century geographic education had been neglected, thus, serious reevaluation began in the early 1980s. Leading up to the reassessment of the status of geographic education in the United States were a series of newspaper reports, nationwide tests, and studies that revealed poor performance of U.S. students in geography (President's Commission on Foreign Language and International Studies 1979; Hill 1981; Natoli 1988; Boehm 1997). The *Guidelines* put forth a concise and unified message that reverberated throughout the world of K-12 education and beyond. The message was simple: across the board improvement was needed in geography. Geography was, and is, much more than rote memorization, and in order to convince the American public of this truth, geography professional organizations, standards, and teachers have to work together (Joint Committee on Geographic Education 1984; Natoli 1988; Boehm 1997).

Geography Education National Implementation Project

To facilitate the success of the *Guidelines*, the Geography Education National Implementation Project (GENIP) was launched in 1985. The Geography Education National Implementation Project (GENIP) is an amalgam of the Association of American Geographers (AAG), American Geographical Society (AGS), the National Council for Geographic Education (NCGE), and the National Geographic Society (NGS). In 1987, GENIP published *K-6 Guidelines* and, in 1989, *7-12 Guidelines* to enhance the scope and sequence message first introduced in the *Guidelines* in 1984 (Boehm 1997). The *Guidelines* and geographic education as a whole were impacted positively by the

foundation of the NGS Network of Alliances for Geographic Education in 1986 (Salter 1986; Salter 1987; Grosvenor 1995; Boehm 1997). The Alliance Network, which is still in place today, works to improve pre-service and in-service teaching. These events of the 1980s reinforced the unified message of leaders in geographic education, emphasizing that reform was necessary and needed to happen sooner rather than later.

Geography Framework for the 1994 National Assessment of Educational Progress

In 1992, the National Assessment Governing Board released *Geography Framework for the 1994 National Assessment of Educational Progress*. This work discussed what should be covered in the 1994 National Assessment of Educational Progress (NAEP) geography assessment at grades four, eight, and twelve. Drawing on the Five Fundamental Themes, the authors produced a scope and sequence focusing on three content areas: Space and Place, Environment and Society, and Spatial Dynamics and Connections (National Assessment Governing Board 1992). Similar to the work of GENIP, this assessment represented a concise and unified message from geography professional organizations such as the National Geographic Society (NGS), as well as, university scholars (Bednarz 2002). Together, the NAEP assessment and the *Guidelines* represented the “reintroduction of meaningful geography content into many K-12 classrooms” (Bednarz 2002, 162).

Geography for Life

Following the reintroduction of geographic education to K-12 education, *Geography for Life*, the voluntary national geography standards were released in 1994. These standards were produced by the National Geography Education Standards Project in conjunction with AGS, AAG, NCGE, and NGS. *Geography for Life* introduced

Americans to the Six Essential Elements—the World in Spatial Terms, Places and Regions, Physical Systems, Human Systems, Environment and Society, and the Uses of Geography—operationalized in the 18 standards (Downs 1994; National Geography Education Standards Project 1994; Boehm 1997; Bednarz, Downs, and Vender 2003).

Among the messages included in this first edition of *Geography for Life* were:

- 1) the importance of using new cartographic technologies,
- 2) demystifying the belief that geography is nothing more than rote memorization,
- 3) stressing the geographic advantage of understanding multiple perspectives,
- 4) promoting the synchronized teaching of geography and history, and
- 5) using geography in everyday life (Boehm 1997).

In addition to these messages, *Geography for Life* informed the various state geography standards throughout the country.

A Decade of Reform in Geographic Education

The first release of *Geography for Life* afforded geographers a moment to reflect on 10 years of geographic education reform. *A Decade of Reform in Geographic Education: Inventory and Prospect* presented five broad themes. These themes were built on the following three premises which state that:

- 1) geographic education should be treated as an interdependent system, from kindergarten through university graduate work;
- 2) pre-service and in-service teacher training must be improved in addition to improving learning materials; geography should champion its real world applications;

3) standards are needed at all levels of geographic education, including the university level (Bednarz and Petersen 1994).

These recommendations were borne out of the Summit in Geographic Education at Texas State University (at the time, Southwest Texas State University) in 1993. The messages produced during the Summit and subsequent manuscripts echo the same messages that were first produced in the 1980s.

Rediscovering Geography

By the mid-1990s, the reform movement in geographic education, along with the messages associated with it, had made significant progress in K-12 education. In 1997, *Rediscovering Geography* was released by the Rediscovery Geography Committee through the National Research Council (NRC). This National Research Council initiative was supported by AAG, Environmental Systems Research Institute (ESRI—now, known simply as, Esri), NGS, National Science Foundation (NSF), as well as, other federal government agencies such as, the Department of Education. Four overriding messages were produced in this work. The first focused on improving geographic understanding, which includes research and collaboration between universities, agencies, and professional organizations. The intended audiences for this message included professional organizations and universities. The second message focused on improving geographic literacy through standards and through education of the public. This message was intended for professional organizations as well as the federal government. The third message, intended for professional organizations, universities, and government agencies, called for strengthening existing geographic institutions through collaborations and technological advancements. The final message called for the implementation of the

previous messages through the collaboration of professional organizations, especially AAG, NGS, NRC, and NSF. While the messages reflected others in previously discussed works, *Rediscovering Geography* represented the first comprehensive evaluation of geography in the United States by the NRC since the 1960s (Rediscovering Geography Committee 1997). This was significant because it reinforced the progress made by leaders in geographic education since the *Guidelines* were first released in 1984. Additionally, this was more than a descriptive account of geography and geographic education. Rather, it addressed what should be done at the moment, as well as, in the future to perpetuate geography.

The First Assessment

Concurrent with the release of *Rediscovering Geography* was *The First Assessment*, a publication of the Gilbert M. Grosvenor Center for Geographic Education (GCGE). Released in 1997, it was the product of a symposium of university scholars and it addressed the progress made since the release of the *Guidelines*, as well as, future research directions to support geographic education. Five areas of research emerged: Curriculum, Teaching Methods, Map Learning, Assessment, Learning Theory, and Special Populations (Boehm and Petersen 1997). This work acknowledged the messages that had been disseminated through the first decade since the release of the *Guidelines* and it also pushed the frontiers of research in geographic education. *The First Assessment's* message was important, and is still relevant today, as it encourages innovation with respect to research. Although it was released nearly two decades ago, it encouraged the exploration and implementation of new technologies and educational theories that might improve the state of geography. This type of message continues to

resonate with leaders in geographic education today, and is a large part of current messages in geographic education.

Path Toward World Literacy

At the turn of the century, the GCGE published *Path Toward World Literacy: A Scope and Sequence in Geographic Education, K-12* and *Path Toward World Literacy: A Standards-Based Guide to K-12 Education*. These documents investigated the *Geography for Life* standards and were rooted in research determining *what* certain skills and topics were taught and *when* they should be taught. The scope and sequence involved background research not apparent in *Geography for Life* and the guide provided a quick and easy way to navigate the matrix that explained the standards and expectations for each grade cluster established in *Geography for Life*. Both documents continue to serve as reference tools and matrices to understanding the standards.

Learning to Think Spatially

In 2006, *Learning to Think Spatially*, an outgrowth of the NRC and National Academy of Science's Spatial Learning Committee on Geography, was released. The dominant message of *Learning to Think Spatially* was that spatial intelligence and learning are vital to the continued existence of geography and geospatial technologies (Committee on Support for Spatial Thinking 2006). The *Geography for Life* standards included spatial thinking as an important part of being a geographically informed person and this demonstrated consistency between messages produced by leaders in geographic education. It also encouraged the incorporation of spatial thinking skills into K-12 education through viable support systems, such as geographic information systems (GIS). While the implementation of such systems was, and is, still problematic, the more

important message in this initiative was that it did not recommend a new curriculum; rather, it proposed that spatial thinking could be incorporated into the curricula of existing subjects. The authors also established that the use of GIS did not mean an investment in expensive hardware or software; rather, they emphasized using tools and techniques that fostered spatial thinking growth, regardless of platform. Additionally, it encouraged students to think spatially, regardless of the school subject, and it stated that spatial thinking should not be taught as a stand-alone subject. The last part of the *Learning to Think Spatially* message was important to note because it demonstrated to teachers that little preparation is needed to blend spatial thinking skills into the established curriculum.

Recent Messages in Geography Education

Geography for Life, National Geography Standards, Second Edition

In 2012, *Geography for Life, National Geography Standards, Second Edition*, was published. This round of standards provides updates from 1994 and “messages” now begin to emphasize that teachers should use more technology and spatial thinking skills in classroom teaching of geography. It is presented in a concise fashion and includes a scope and sequence, making it a relevant reference tool for teachers familiar with the 1994 standards as well as for those teachers unfamiliar with the standards. In the second edition, Heffron and Downs (2012) address the changing landscape of geographic education in the United States. They emphasize the increased role that technology plays in K-12 education. For instance, the first geography standard in the First Essential Element (“The World in Spatial Terms”) states that the “geographically informed person must use maps and other geographic representations, geospatial technologies, and spatial

thinking to acquire, understand, and communicate information (Heffron and Downs, 2012, 21). The authors also state that “problem-solving geospatial technologies such as geographic information systems (GIS), global positioning systems (GPS), and remote sensing (RS) may be used across curricula and to do so, will have profound and pervasive effects on career opportunities” (Heffron and Downs, 2012, 9). Such statements represent a significant shift in American education, as technology has become an integral part of the learning experience, regardless of the content (Pearson and Young 2002).

Why Geography Is Important

Also published in 2012, *Why Geography Is Important*, a pamphlet produced by the GCCGE in conjunction with AAG, NCGE, and NGS, provides quality geographic explanations in an easy to read format. Like the works discussed above, it stresses the importance of having a firm grasp of geographic skills to take full advantage of geospatial technologies. “Each new development, from GPS-enabled smartphones to real-time traffic maps, demonstrates the importance of the geographic uses of geospatial technologies (Gilbert M. Grosvenor Center for Geographic Education 2012, 6). Online mapping services and other geospatial technologies that are being used today demonstrate the opportunities teachers have to incorporate such technologies into their classrooms and do so in an effective manner.

A Road Map for 21st Century Geography Education

This joint effort between AAG, AGS, NCGE, and NGS echoes the sentiments expressed in *Geography for Life* and *Learning to Think Spatially*. Amongst the many recommendations is the continued and increased use of geospatial technologies in K-12 geography education. The authors state that geography is “well positioned to utilize and

integrate technology tools to enhance students' experiences of geographic phenomena, especially with new resources in geospatial technologies (Schell, Roth, and Mohan 2013, 99). Such technologies can assist in map understanding (Sinton and Lund 2007), improving content knowledge (Bodzin 2011; Shin 2007; Songer 2010) and spatial thinking skills (Resler and Kolivras 2009; Theo 2011; Wigglesworth 2003), the growth of analytic abilities (Kulo and Bodzin 2011; Lio, Bui, Chang, and Lossman 2010), and such technologies help under-represented groups the most (Lee and Bednarz 2009; Rutherford and Lloyd 2001). They also acknowledge that such usage is dependent upon prior teacher training, resource availability. The authors also provide a list of available online resources for geospatial technology lessons. The *Road Map* makes a strong case toward encouraging teachers to use geospatial technologies in the classroom, and provides in great detail the numerous benefits for students and teachers alike.

Messages Arising from Professional Conferences

Professional conferences generate a number of messages and represent opportunities for key events in the evolution of geographic education. The GCGE has hosted biannual research conferences for over two decades where the goals were to bring early career scholars into the geographic education research circle. Early career scholars work with senior scholars, promoting collaborations amongst a variety of colleges, universities, and professional organizations. The AAG, NCGE, and the Applied Geography annual conferences all dedicate a number of sessions to geographic education. These conferences are vital to the health and growth of geographic education, as researchers from geographic education, as well as, diverse other sub-disciplines in geography have the opportunity to hear the latest research and trends in geographic

education. At the same time, geographic education scholars push the frontiers of research through interaction with one another.

Each of the works discussed are summarized in Table 4.1 and indicate that leaders in geographic education have diverse views regarding “messages” for the classroom teacher in teaching geography—“how” to teach, “what” to teach in K-12 geography, and “when” to introduce geography material. Early messages centered on traditional approaches for teaching geography while more recent messages –influenced by science, technology, engineering, and mathematics (or, STEM) directions—have emphasized spatial thinking, and ways to incorporate geospatial technologies in the classroom.

Table 4.1. Phase 1: Content Analysis Major “Messages” in the Evolution of Modern Geographic Education

Document/Event	Year	Purpose/Intent	Message for Teachers
<i>Guidelines for Geographic Education</i>	1984	Five Fundamental Themes; Scope and sequence	Across the board improvement needed
<i>GENIP</i>	1985	Facilitate success of the <i>Guidelines</i>	Improve pre-service and in-service training
<i>Alliance Network</i>	1986	Improve pre-service and in-service teacher education	Improve pre-service and in-service training
<i>K-6 Guidelines</i>	1987	Scope and sequence for <i>Guidelines</i>	Use the <i>Guidelines</i>
<i>7-12 Guidelines</i>	1989	Scope and sequence for <i>Guidelines</i>	Use the <i>Guidelines</i>
<i>Geography Framework for the 1994 National Assessment of Educational Progress</i>	1992	What should be assessed by NAEP at grade levels 4, 8, and 12	Assessments are related to the <i>Guidelines</i>
<i>Geography for Life</i>	1994	Six Essential Elements; Eighteen National Standards	Voluntary national standards for geography
<i>A Decade of Reform in Geographic Education</i>	1994	Integration and application of geography	Quality and quantity of geographic education must improve
<i>Rediscovering Geography</i>	1997	Descriptive and prescriptive assessment of geographic education	Collaboration; better research; public outreach
<i>The First Assessment</i>	1997	New research in geographic education	Continue to push the boundaries of research in geographic education

Table 4.1-Continued			
Document/Event	Year	Purpose/Intent	Message for Teachers
<i>Path Toward World Literacy</i>	2001-2002	Content-specific matrix; Scope and sequence	Use <i>Geography for Life</i>
<i>Learning to Think Spatially</i>	2006	Increase spatial thinking skills in K-12	Spatial thinking skills can be infused into the curricula of existing subjects
<i>Geography for Life Second Edition</i>	2012	Update the 1994 Standards	Incorporate more technology and spatial thinking skills
<i>Why Geography Is Important</i>	2012	Easy to read reference guide	Increase use of technology and promote applied geography
<i>A Road Map for 21st Century Geography Education</i>	2013	Improve geographic research and instruction	Update research, teaching techniques, and technologies
<i>Professional conferences</i>	N/A	Present research, push frontiers of research in geographic education	Improve content and pedagogical content knowledge

Influences beyond Academia: Organizations for Geographic Education and their Messages

Non-profit organizations such as the Association of American Geographers (AAG), Grosvenor Center for Geographic Education (GCGE), National Council for Geographic Education (NCGE), and National Geographic Society (NGS) (along with the NGS Network of State Alliances for Geographic Education) have been disseminating geographic messages throughout the late 20th and early 21st centuries, however, all have a different focus and purpose. The AAG promotes a distinct perspective, one in which geography provides answers to big, nebulous questions. For instance, the AAG's Geography Education Specialty Group promotes systemic professional development and research related to geography education in general; it is not confined to the constructs of K-12 geographic education (Association of American Geographers 2013). The GCGE

operates under the premise that the research and professional development conducted there will generate leadership opportunities to raise the quality of geographic education (The Gilbert M. Grosvenor Center for Geographic Education 2013). The NCGE's mission statement echoes the sentiments of the Grosvenor Center as its main goal is to improve the visibility and quality of geographic education. (National Council for Geographic Education 2013) while the NGS—one of the largest nonprofit scientific and educational institutions in the world— seeks to create interested in our world, underlain with geographic concepts, since the nineteenth century (National Geographic Society 2013). The NGS Network of Alliances for Geographic Education is a collection of state organizations with a unified goal of improving geographic education and its mission is to systematically help make Americans more geographically literate (National Geographic Network of Alliances for Geographic Education 2013). The Alliance network is designed to bring K-12 and university educators together to improve the quality of geographic education. Each of these organizations promotes geographic education, yet Americans have room to improve their geographic knowledge.

Technology's Impact on Geography Education

These organizations are at the forefront of geographic education in the United States and draw upon advancements in technology and education for message development and dissemination to teachers. Technological advancements over the course of the last few decades have introduced more choices for the way that Americans learn geography and interact with maps. Computer and phone-based mapping services are expanding and creating new challenges for users (Münzer et al. 2006; Ishikawa et al. 2008; Speake and Axon 2012). Former President of the British Cartographic Society,

Mary Spence, MBE, stated that the willingness to rely on technology implies a certain degree of fear to use traditional methods of navigation (Gray 2008). More recent developments in information communication technology (ICT) also indicate that a fundamental shift in the way spatial learning takes place is occurring –a paradigm focused on technology and reliant upon the aforementioned professional organizations for promoting and disseminating messages about new ways of teaching geography.

CHAPTER 5

DESCRIPTIVE DATA ANALYSIS

Phase 2 was comprised of an online survey disseminated to a sample of teachers in Texas. The survey questionnaire consisted of 27 questions that addressed the components of the education communication model presented in Chapter II. These components consisted of: message characteristics, receiver characteristics, teachers' perceptions of messages, teachers' confirmation of messages with their colleagues, and teachers' actions, if any. Specifically, questions addressed the behaviors of: *hearing, understanding, believing, perceiving, confirming, and acting*. The survey was distributed to two professional organizations using a snowball sampling method. The first group that received the questionnaire consisted of members of the Texas Alliance for Geographic Education (TAGE), using the listserv for an e-mail newsletter which is maintained by the TAGE at Texas State University. The online survey instrument was disseminated to 1,936 subscribers of the TAGE e-newsletter; however, the personnel that compile the e-newsletter mentioned that the newsletter only has an active readership of around 300. The TAGE group of teachers received two notifications for opportunities to participate in the survey. The second notification came one week after the first as a reminder/request to please complete the survey. The second group that received the survey questionnaire was comprised of a listserv of 212 educators that were members of the Texas Social Studies Supervisors Association. This group also received two notifications for opportunities to participate in the survey with the second notification appearing two weeks after the first. In addition, members receiving the questionnaire were also asked to forward the survey to teachers that they thought might be interested in participating in the survey, but who

were not included in the listservs. Snowball sampling was used to increase participation through contacts in an effort to reach hidden populations (Goodman 1961). This methodology was necessary as there was not an accessible master list of all geography teachers in Texas.

Exploratory Data Analysis – Descriptive Statistics

The two listservs generated a response total of 66 surveys. The survey instrument included 27 items that teachers responded to, and the average time to complete the survey was 24 minutes. Each survey item was designed to represent part of the theorized process of communication between geographic education leaders and K-12 classroom teachers of geography, as depicted in Figure 1. Qualitative responses to the open-ended items are addressed later in the chapter. Table 5 describes the relationship between each hypothesis and each of the online survey items.

Table 5.1. Relationship between Hypotheses and Online Survey Items

Hypothesis	Survey Item(s)
1 Hearing	Q1, Q7, Q8, Q15, Q16
2 Understanding	Q4, Q5, Q14
3 Believing	Q3, Q9, Q12
4 Perceiving	Q10, Q11, Q18, Q19
5 Confirming	Q17
6 Acting	Q2, Q6, Q13

Six questions addressed Hypothesis 1, “Hearing;” three questions addressed Hypothesis 2, “Understanding;” two questions addressed Hypothesis 3, “Believing;” four questions addressed Hypothesis 4, “Perceiving;” was addressed by one question, Hypothesis 5, “Confirming;” was addressed by three questions, and Hypothesis 6, “Acting” by three questions. These hypotheses reflected the Theorized Process of Communication between

Geographic Education Leaders and K-12 Classroom Teachers of Geography Model. The survey item analysis is presented below with a discussion of the results from each. The survey questionnaire in its entirety may be found in Appendix 1.

In the table headings below, acronyms are used to increase table readability. The acronyms are as follows: GGE stands for *Guidelines for Geographic Education* (Five Fundamental Themes); GFL1 stands for *Geography for Life* (Six Essential Elements; 18 National Standards); LTS stands for *Learning to Think Spatially*; GFL2 stands for *Geography for Life – National Geography Standards, Second Edition*; WGI stands for *Why Geography is Important*; RM21 stands for *A Road Map for 21st Century Geography Education*; SD (σ) stands for *standard deviation*; TR stands for *Total Responses*.

Model Component 1—“Hearing.” To what extent do classroom teachers of geography “hear” or learn about the teaching of geography in the classroom from leaders in higher education and/or the community of professional geographers? What are the sources of messages, and how frequently are they used?

The communication model component of “hearing” was examined from questions that asked about familiarity of geographic education messages from leaders in geographic education, and frequency of usage of these materials.

Please select the geographic education publications that you are familiar with (Please check all that apply).

Over half of the sample of teachers (52%) reported that, *Geography for Life – National Geography Standards, Second Edition*, was the publication that they were most familiar with. Additionally, 46% of teachers are familiar with the first edition of *Geography for Life*. Teachers were least familiar with the more recent publications, *Learning to Think Spatially*, and *A Road Map for 21st Century Geography Education*.

Only 12 respondents reported that they were unfamiliar with the six documents listed in the question. Figure 5.1, shown below, lists the publications in Question 1. The list represents an array of diverse message sources, and, thus, a diverse array of messages. Nonetheless, responses from Question 1 reveal that the teachers mainly “hear,” or receive messages from sources that focus on traditional content approaches to teaching geography or ones that mix content with spatial thinking using technology in the classroom. Figure 5.2 reports the aggregate mean, median, and mode values for all answers from Question 1. The overall mean value is 6.67; the overall median value is 9; the overall mode value is 10. An in-depth examination of the difference among sources from teacher interviewees is included in the qualitative results section.

Table 5.2. Familiarity with Messages from Leaders in Geographic Education

Likert Item	Responses	Percentage
Guidelines for Geographic Education	22	35%
Geography for Life	29	46%
Learning to Think Spatially	12	19%
Geography for Life, Second Edition	33	52%
Why Geography is Important	21	33%
A Road Map for 21 st Century Geography Education	12	19%
Other academic or professional geography education publication(s) that you are familiar with, but not listed (Please list)	15	24%
I am not familiar with any of the above documents (Please explain)	12	19%

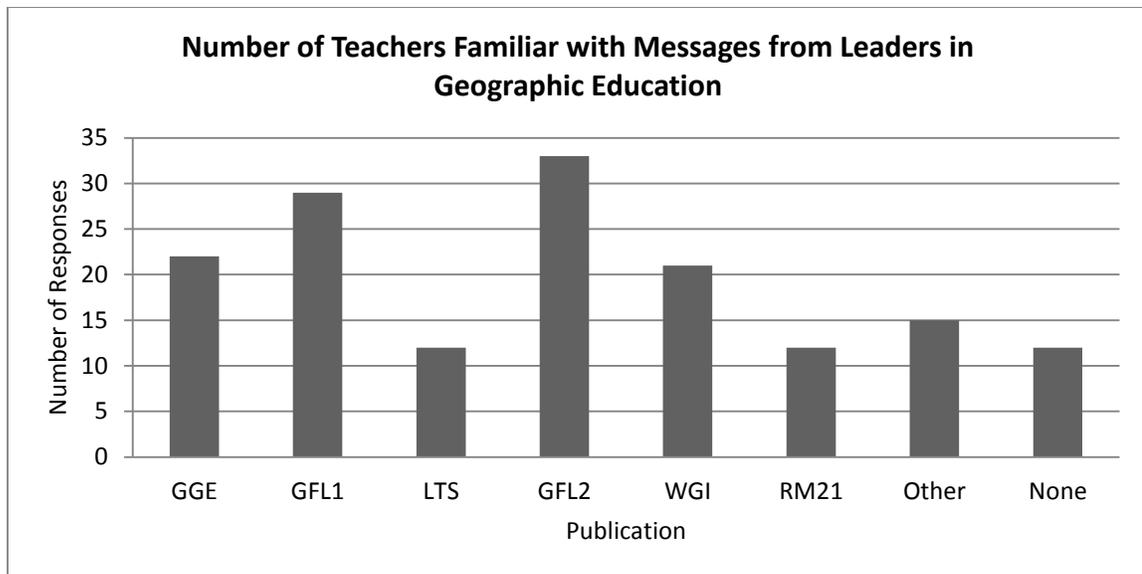


Figure 5.1. Number of Teachers Familiar with Messages from Leaders in Geographic Education

Figure 5.2, shown below, presents a summary of the number of documents familiar to teachers. Twelve teachers (19%) were not familiar with any of the documents. Seventeen teachers (27%) were familiar with one document. Eleven teachers (17%) were familiar with two documents. Six teachers (10%) were familiar with three documents. Six teachers (10%) were familiar with four documents. Four teachers (6%) were familiar with five documents. Six teachers (10%) were familiar with six documents. One teacher (2%) was familiar with seven documents.

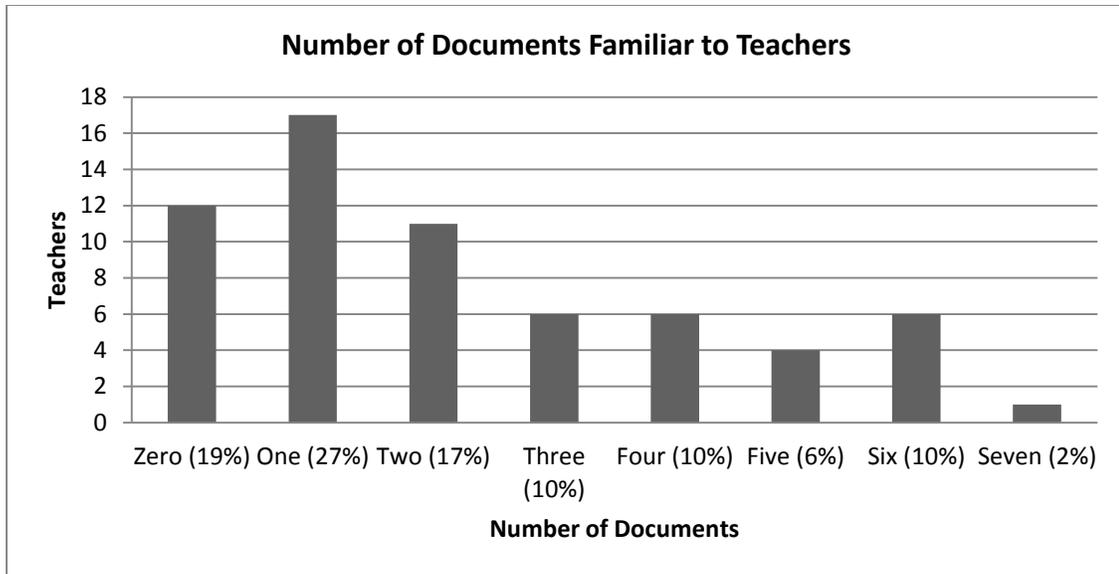


Figure 5.2. Numbers of Documents Familiar to Teachers

Figure 5.3 reveals the mean, median, and mode for document familiarity.

Overall, the mean number of documents familiar to teachers was 2.29. The median number of documents was 2 and the mode was 1.

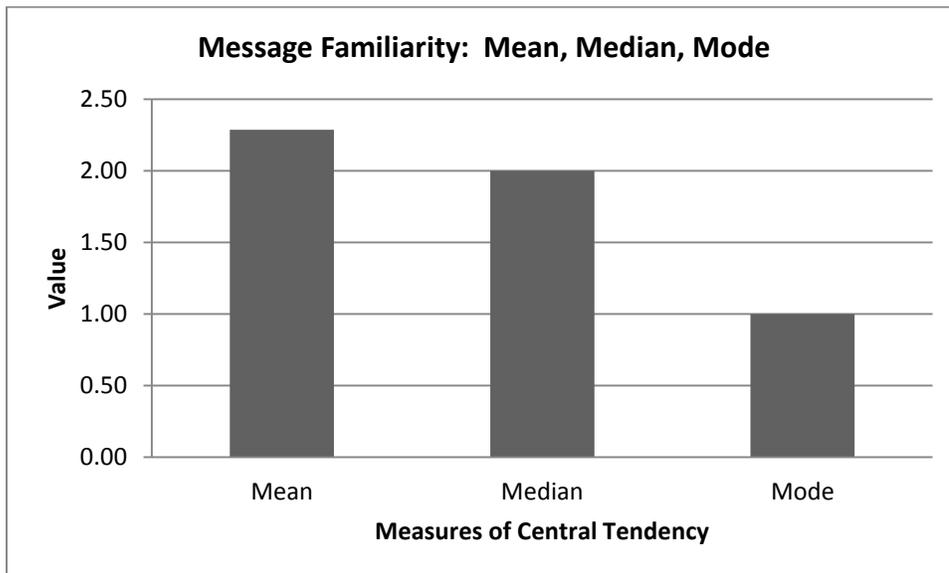


Figure 5.3. Message Familiarity: Mean, Median, Mode

Please indicate the importance of each of the sources below for bringing to your attention any national geographic education publication that concerns K-12 teaching of geography. (1=extremely important; 2=important; 3=not important at all; 4=not applicable).

Table 5.3 reports data on levels of importance of various sources for awareness of messages. The mean values ranged from 1.20 to 1.91, which indicated a high degree of importance for each source. Each source’s mean value ranged between *important* and *extremely important*. The small degree of variance for each source indicated that the data were not very spread out. The standard deviations revealed that most data were within one standard deviation of the mean. The total number of responses was equal to 47 or greater with the exception of the “Other Source” which only had 5 responses. Of those Likert items with 47 or more responses, “Professional development activities” were the most important for teachers with a mean value of 1.38. Individuals at academic institutions had the lowest mean value (1.91).

Table 5.3. Importance of Sources for Awareness of Messages

Likert Item	Mean	Variance	SD (σ)	TR
Professional development activities	1.38	0.32	0.56	53
From my co-workers at my school	1.56	0.29	0.54	48
From colleagues outside of school network	1.74	0.52	0.72	50
From searching the Internet	1.63	0.39	0.63	52
From individuals at a professional organization	1.58	0.50	0.71	48
From individuals at an academic institution	1.91	0.64	0.80	47
Other Source	1.20	0.40	0.63	5
Total	1.62	0.67	0.46	303

Figure 5.4 included measures of central tendency for importance of sources for awareness of messages. The mean was 1.62, the median was 2, and the mode was 1.

This survey item totaled 303 responses, and were the result of teachers indicating the importance of each of the seven individual sources.

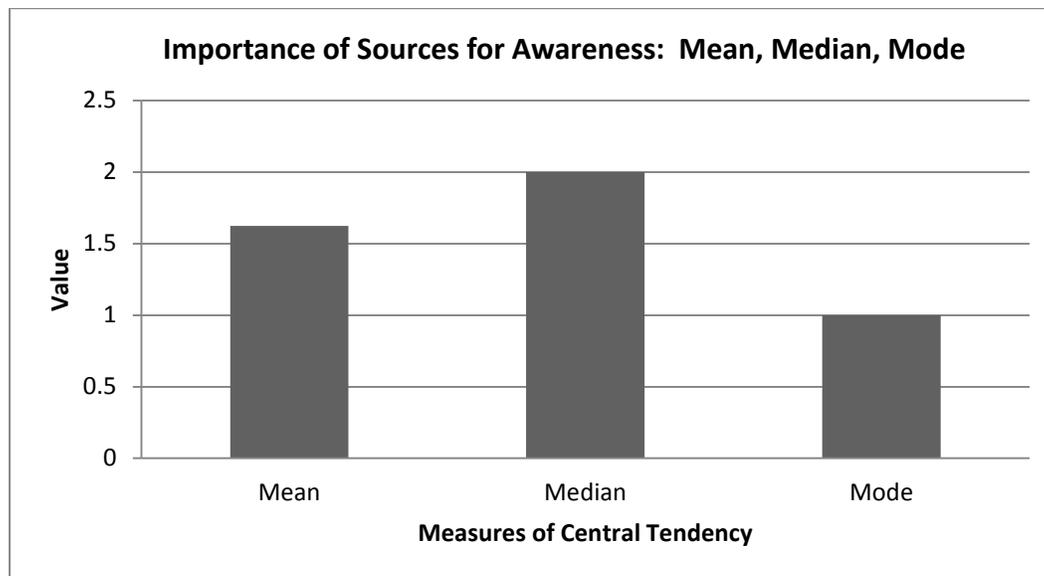


Figure 5.4. Importance of Sources for Awareness: Mean, Median, Mode

Please select the academic or professional organizations in geographic education that you are familiar with (Please check all that apply).

Table 5.4 and Figure 5.5 demonstrated teachers' familiarity with academic and professional organizations in geographic education. Teachers were most familiar with National Geographic Society (85% of respondents), followed by the National Council for Geographic Education (80%). Teacher familiarity with the remaining organizations decreased to 47% for the Grosvenor Center for Geographic Education, 37% for the Association of American Geographers, and 31% for the American Geographical Society.

Table 5.4. Familiarity with Professional Organizations in Geographic Education

Likert Item	Responses	%
Association of American Geographers (AAG)	22	37
American Geographical Society (AGS)	18	31

Table 5.4-Continued		
Likert Item	Responses	%
National Council for Geographic Education (NCGE)	47	80
National Geographic Society (NGS)	50	85
Other academic or professional geographic education organizations that you are familiar with, but not listed	14	24

Fifty-nine teachers responded to this survey item. Figure 5.5, shown below, revealed that nine teachers (15%) were familiar with one organization. Seventeen teachers (34%) were familiar with two organizations. Thirteen teachers (22%) were familiar with three organizations. Five teachers (8%) were familiar with four organizations. Thirteen teachers (22%) were familiar with five organizations. Two teachers (3%) were familiar with six organizations.

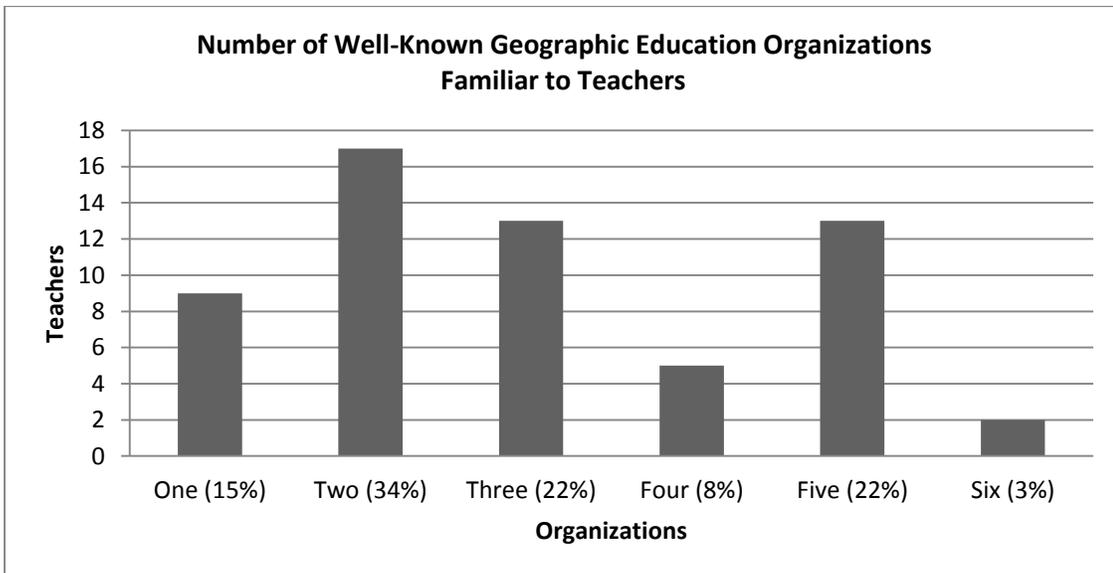


Figure 5.5. Number of Well-Known Geographic Education Organizations Familiar to Teachers

In addition, Figure 5.6 below shows measures of central tendency in regards to organization familiarity. The mean value for organization familiarity was 3.03; the median value was 2.50 and the mode was 2.

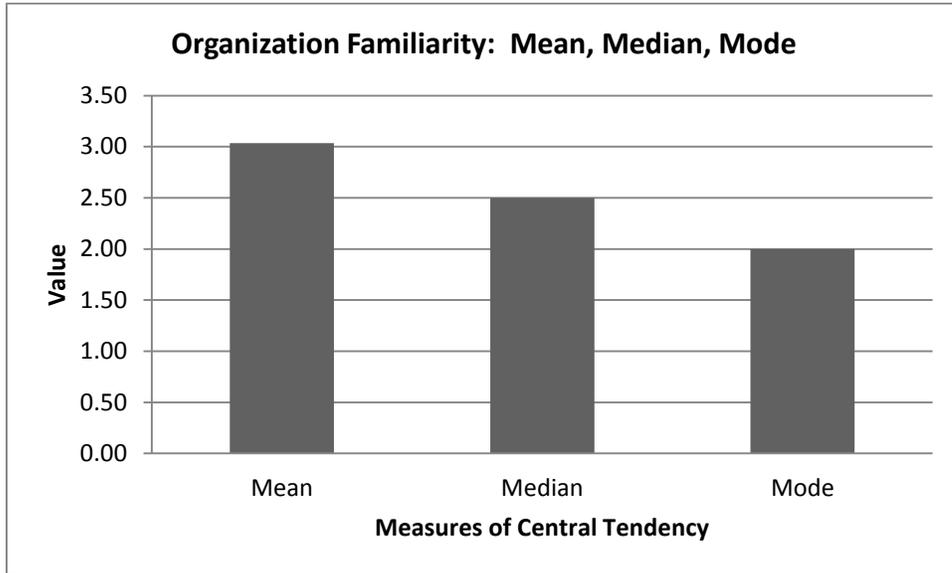


Figure 5.6. Organization Familiarity: Mean, Median, Mode

Prior to teaching your geography course(s), please indicate the importance of the following sources for developing your course(s). (1=extremely important; 2=important; 3=not important at all; 4=not applicable).

Ten teachers reported that professional development, such as summer institutes, workshops, or informal training, were the most important sources for developing geography courses prior to teaching geography for the first time. These professional development activities had a mean value of 1.27. Supplementary printed materials, such as maps, atlases, magazines, and trade books were the next most important, with a mean value of 1.31. All of the potential sources for course development were in the mid- to upper-levels of importance in regards to mean values with one exception. GeoInformatics, technology for geography in classroom usage had a mean value of 2.14.

Table 5.5. Importance of Sources for Course Development

Likert Item	Total Responses	Mean
Professional development	59	1.27
Formal, published documents	56	1.89
Geography textbook	54	1.85
Supplementary printed materials	58	1.31
Internet	57	1.40
Google Maps	54	1.74
GeoInformatics	51	2.14
Other	10	1.20
Sum	399	1.63

Figure 5.7 shows the mean, median, and mode for the importance of sources for course development prior to teaching. The mean value was 1.63; the median value was 1; the mode was 1.

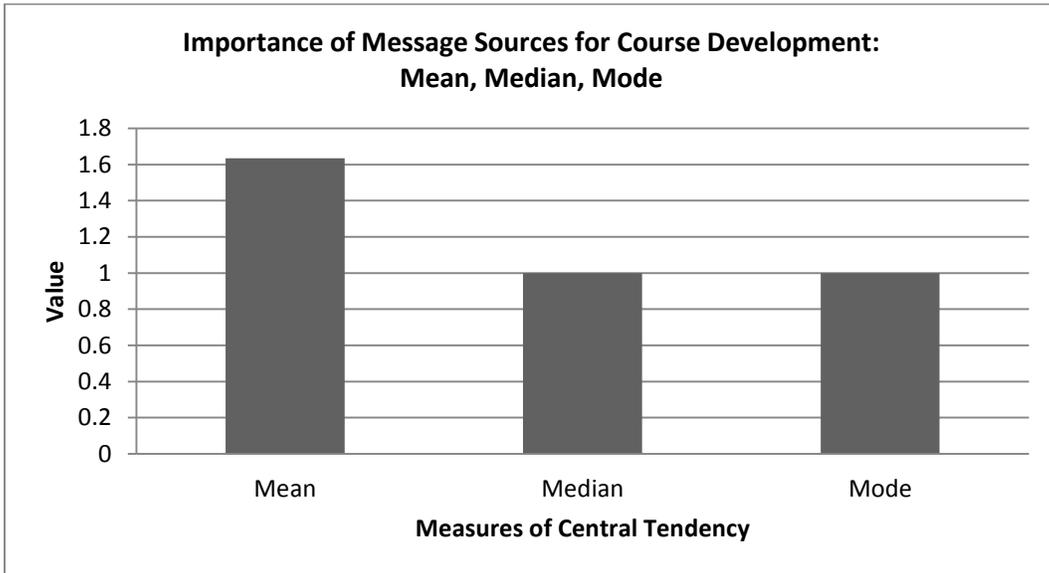


Figure 5.7. Importance of Message Sources for Course Development: Mean, Median, Mode

Now that you have experience teaching geography courses, please indicate the importance of the following sources for teaching your courses. (1=extremely important; 2=important; 3=not important at all; 4=not applicable).

For the importance of sources for teaching geography courses, teachers reported that professional development, such as summer institutes, workshops, or informal training, were the most important sources for in-service geography course development. These professional development activities had a mean value of 1.27. Supplementary printed materials, such as maps, atlases, magazines, and trade books were the next most important, with a mean value of 1.33. All of the potential sources for course development were in the mid- to upper-levels of importance in regards to mean values. Teachers identified geography textbooks and GeoInformatics as the least important sources with mean values of 1.95 and 1.96 respectively.

Table 5.6, below, provides a summary of the questions included in Model Component 1 – “Hearing.” The total number of responses, represented by “N” in the table, varies because certain questions allowed teachers to respond multiple times, thus generating higher than expected N values. The range for each question varied as different scales were used for certain questions. The standard deviations and variances for each question were relatively low. The coefficient of variation, represented by “CV” in the table, allowed for comparisons of variability between datasets. Table 5.6 revealed that Question 1 had the greatest amount of variation, compared to the other questions. Questions 7, 8, 15, and 16 all had coefficients of variation (CV) between 41 and 49. The mode represented the most common answer selected for each question and, with the exception of Question 8, the most common answer was 1, while the most common answer for Question 8 was 2. The standard error, represented by “Std. Error” in the table, reported the amount of variability from the mean. Each question had statistically

significant standard error value, indicating that these samples are likely to be a good representation of the population.

Table 5.6. Model Component 1 – “Hearing” Summary Table

Question	N	Range	Min.	Max	Mean	Std. Dev.	Var.	CV	Mode	Std. Error
1	63	8	0	8	2.29	2.00	3.98	87.30	1	0.25
7	303	2	1	3	1.62	0.68	0.46	41.80	1	0.04
8	59	6	1	6	3.03	1.47	2.17	48.56	2	0.19
15	399	2	1	3	1.63	0.75	0.57	46.17	1	0.04
16	422	2	1	3	1.61	0.71	0.51	44.27	1	0.03

Model Component 2—“Understanding.” To what extent do classroom teachers of geography “understand” messages? Do other factors that are internal and external to the teacher (i.e., receiver characteristics) play a role?

The communication model component of “understanding” was examined from questions that asked about the *clarity* and *consistency* of geographic education messages from leaders in geographic education across sources, as well as, message and organization applicability to state geography standards.

On a scale from 1 to 10, where 1 represents “extremely understandable” and 10 represents “not understandable at all,” please indicate your opinion about the general level of easiness or difficulty in understanding “messages” from the following publications about the teaching of K-12 geography.

Topics from leaders in geographic education spanned a continuum from technology usage for developing map skills, spatial skills, and knowledge, to the use of more traditional content approaches using materials, such as textbooks and hard copy static maps. Table 5.7 revealed that teachers reported that messages disseminated by leaders in geographic education were understandable with, *Why Geography Is Important*, and *Geography for Life – National Geography Standards, Second Edition*, having mean

values that fell closest to “extremely understandable.” The least understandable messages were reported for the “Other” category with a mean value of 4.39. The variance and standard deviation values indicated that the data had a wide distribution. The smallest variance, though not statistically significant, was for *A Road May for 21st Century Geographic Education* (3.21). *Why Geography is Important* had the largest standard deviation at 4.53, indicating the widest distribution of values. (In a subsequent chapter, the qualitative analysis from teacher interviewees will shed perspective on the extent to which there were other internal and external factors at play which determined teachers’ preferences for receipt of messages that related to geography teaching.)

Table 5.7. Understandability of Messages

Likert Item	Mean	Variance	SD (σ)	Responses
GGE	3.62	8.71	2.95	26
GFL1	3.52	12.54	3.54	31
LTS	3.17	5.29	2.30	18
GFL2	2.89	18.72	4.33	35
WGI	2.69	20.49	4.53	26
RM21	3.74	3.21	1.79	19
Other	4.39	3.51	1.87	18
Total	3.36	8.17	2.86	173

Figure 5.8 shows the mean, median, and mode for the understandability of messages disseminated by leaders in geographic education. The mean value was 3.36; the median value was 2; the mode was 1.

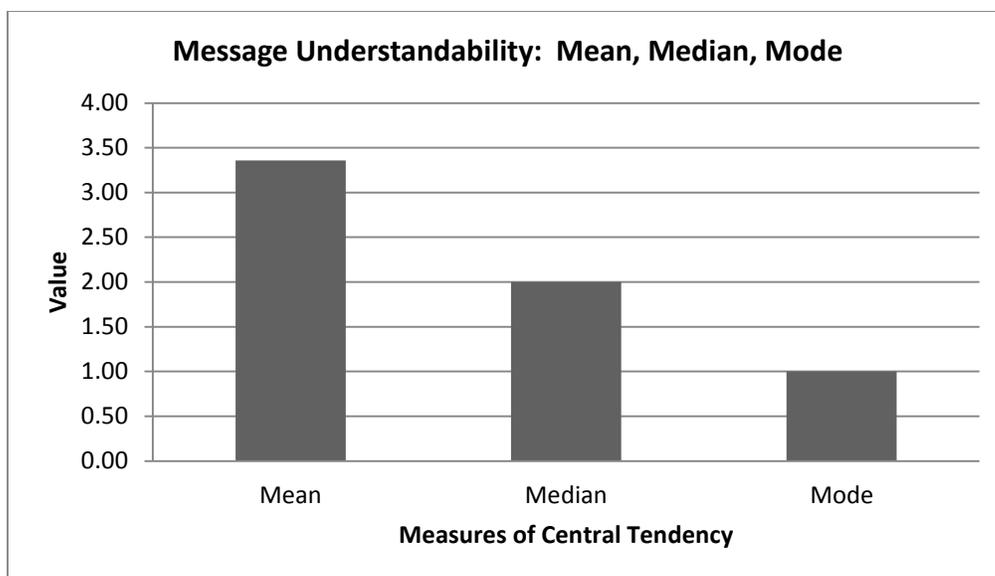


Figure 5.8. Message Understandability: Mean, Median, Mode

On a scale from 1 to 10, where 1 represents “extremely applicable to state standards,” and 10 represents “not at all applicable to state standards,” please indicate your opinion as to how applicable the “messages” from each publication are to your state geography standards in the teaching of K-12 geography.

Teachers reported that *Why Geography is Important* was the closest to “extremely applicable to state geography standards” with a mean of 3.33. They also reported that the *Guidelines for Geographic Education* were the least applicable to Texas’ state geography standards with a mean value of 4.39. Both editions of *Geography for Life* and *Why Geography is Important* had a greater amount of variance than the other documents listed. The standard deviations indicated a wider distribution of values for those documents. *Learning to Think Spatially* had the lowest standard deviation value, indicating it had the narrowest distribution of values (Table 5.8).

Table 5.8. Applicability of Messages to State Standards

Likert Item	Mean	Variance	SD (σ)	Responses
GGE	4.39	7.07	2.66	28
GFL1	3.94	18.68	4.32	33
LTS	4.00	2.84	1.69	18
GFL2	3.66	14.68	3.83	32

Table 5.8-Continued				
Likert Item	Mean	Variance	SD (σ)	Responses
WGI	3.33	14.68	3.83	27
RM21	4.05	3.88	1.97	19
Other	4.07	3.61	1.90	15
Total	3.90	8.94	2.99	172

Figure 5.9 shows the mean, median, and mode for the applicability of messages to state standards disseminated by leaders in geographic education. The mean value was 3.90; the median value was 3; the mode was 1.

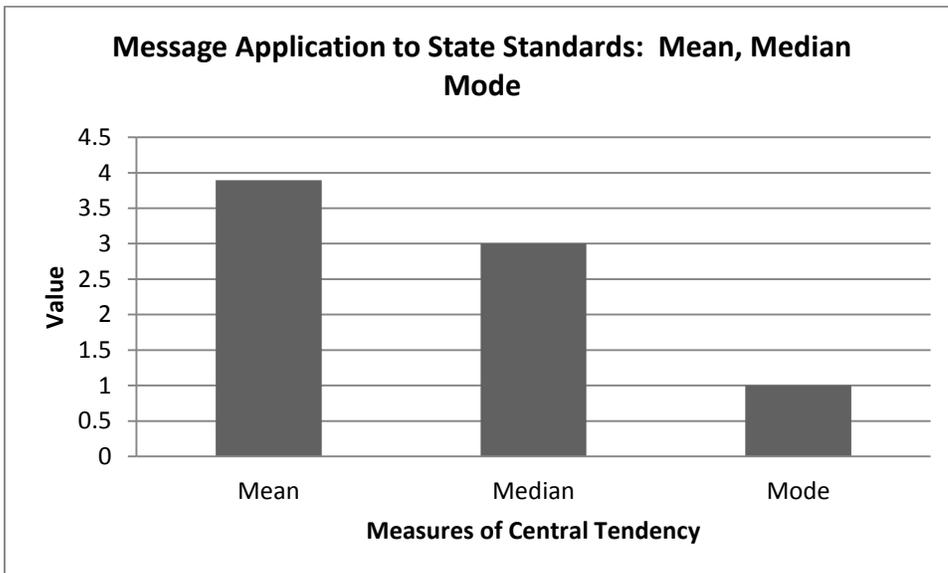


Figure 5.9. Message Application to State Standards: Mean, Median, Mode

On a scale from 1 to 10, where 1 represents “extremely aware of my state standards” and 10 represents “not at all aware of my state standards” in their “messages,” please indicate your opinion as to how aware these academic and professional organizations are of my state standards when they disseminate messages for the teaching of K-12 geography.

Table 5.9, shown below, revealed that teachers believed that the following organizations had a relatively low amount of awareness of state geography standards in Texas. The Grosvenor Center for Geographic Education had a relatively high mean value of awareness” at (4.03) while the American Geographical Society had the lowest

awareness with a mean value of 6.24, excluding the “Other” category, which had a mean value of 2.77 with thirteen respondents. The Grosvenor Center also had the greatest amount of variance (16.54), indicating a wide dispersion across the dataset. The American Geographical Society has the lowest variance (2.54) as well as the lowest standard deviation (1.60), thus indicating that the AGS had the narrowest dispersion of data.

Table 5.9. Organizations’ Awareness of State Standards

Likert Item	Mean	Variance	SD (σ)	Responses
AAG	6.23	2.62	1.62	22
AGS	6.24	2.54	1.60	21
GCGE	4.03	16.54	4.07	31
NCGE	4.48	7.60	2.76	44
NGS	4.66	6.49	2.55	44
Other	2.77	7.79	2.79	13
Total	4.75	11.13	3.34	175

Figure 5.10 shows the mean, median, and mode for the applicability of messages to state standards disseminated by leaders in geographic education. The mean value was 4.75; the median value was 4; the mode was 1.

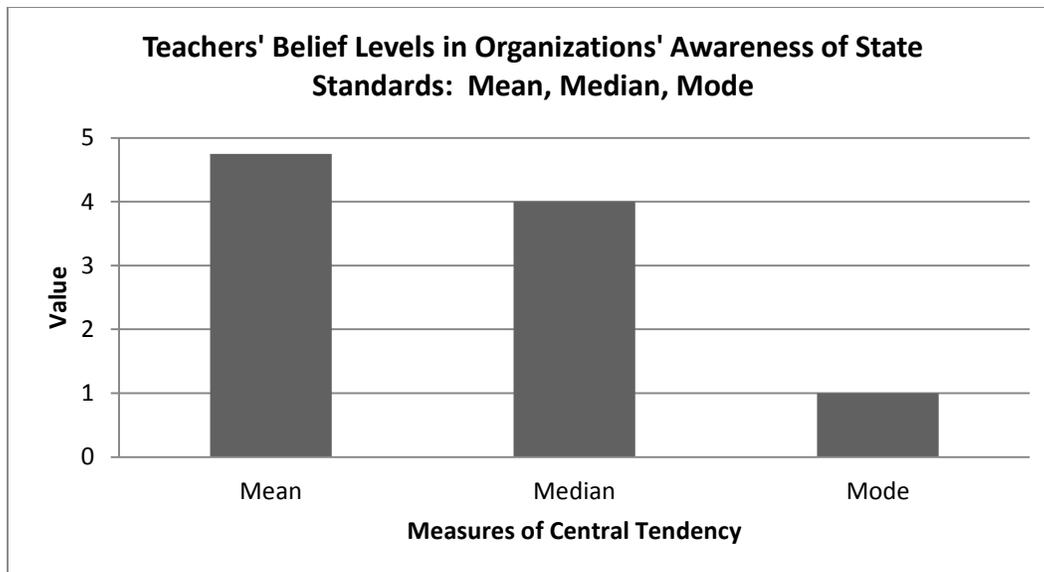


Figure 5.10. Teachers' Belief Levels in Organizations' Awareness of State Standards: Mean, Median, Mode

Table 5.10, shown below, provides a summary of the questions included in Model Component 2 – “Understanding.” The total number of responses, represented by “N” in the table, varied because certain questions allowed teachers to respond multiple times, thus generating higher than expected N values. The range for each question was 9 as teachers were asked to give responses for each question on a scale from 1 to 10. The standard deviations and variances for each question were relatively low, with Question 14 having the highest variance (11.13) and the highest standard deviation (3.34). The coefficient of variation, represented by “CV” in the table, allowed for comparisons of variability between datasets. Table 5.10 revealed that Question 4 had the greatest amount of variation, compared to the other questions. Questions 4, 5, and 14 all had coefficients of variation greater than 70. The mode represented the most common answer selected for each question with the most common answer being, 1. The standard error, represented by “Std. Error” in the table, demonstrated the amount of variability from the mean. Each question had very small standard error values, ranging from 0.22 to 0.25.

Table 5.10. Model Component 2 – “Understanding” Summary Table

Question	N	Range	Min.	Max	Mean	Std. Dev.	Var.	CV	Mode	Std. Error
4	173	9	1	10	3.36	2.86	8.17	85.13	1	0.22
5	172	9	1	10	3.90	2.99	8.94	76.74	1	0.23
14	175	9	1	10	4.75	3.34	11.13	70.26	1	0.25

Model Component 3—“Believing/Trust.” How much do classroom teachers of geography “believe,” or trust the information that they receive from leaders of geographic education?

The communication model component of “believing” was examined from questions that asked about trust of geographic education messages from leaders in geographic education, as well as trust of the organizations involved in geographic education frequency of usage of these materials.

On a scale from 1 to 10 where 1 represents “extreme trust” and 10 represents “no trust at all,” please indicate your trust in the “messages” from these publications for the teaching of K-12 geography.

Table 5.11 reported data on levels of trust in messages from leaders in geographic education. The mean values between 3.50 and 4.84 indicated middle-range levels of trust in these documents. In particular, levels of trust were highest for messages in the publications, *Why Geography is Important*, *Learning to Think Spatially*, and *Geography for Life – National Geography Standards, Second Edition*. The variances and standard deviations varied, indicating that some documents had a wide distribution in the dataset, while others had narrow ranges.

Table 5.11. Teachers' Trust of Messages

Likert Item	Mean	Variance	SD (σ)	Responses
GGE	4.64	8.84	2.97	28
GFL	4.09	12.93	3.60	34
LTS	3.55	8.84	2.97	22
GFL2	3.71	25.17	5.02	35
WGI	3.50	20.18	4.49	28
RM21	4.29	6.10	2.47	21
Other	4.84	7.21	2.69	19
Total	4.05	12.09	3.48	187

Figure 5.11 shows the mean, median, and mode for the trust of messages disseminated by leaders in geographic education. The mean value was 4.05; the median value was 2; the mode was 1.

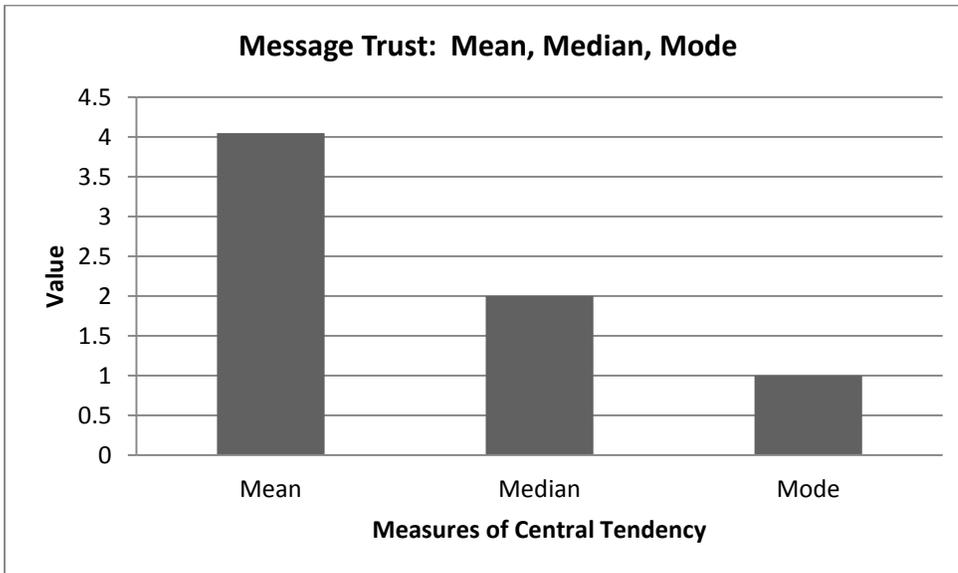


Figure 5.11. Message Trust: Mean, Median, Mode

If you are a member of one of these organizations, please indicate below.

Table 5.12 reports data regarding teachers' membership in professional organizations. The National Council for Geographic Education had the most members (25) while the American Geographical Society had the fewest members (2). The second

highest response was for the “Other” category, in which 11 of those responses indicated teachers were members of the Texas Alliance for Geographic Education.

Table 5.12. Teachers’ Membership in Professional Organizations

Answer	Responses	%
Association of American Geographers (AAG)	3	8
American Geographical Society (AGS)	2	5
Grosvenor Center for Geographic Education (GCGE)	10	25
National Council for Geographic Education (NCGE)	25	63
National Geographic Society (NGS)	16	40
Other academic or professional geographic education organizations that you are a member of, but not listed	17	43

Figure 5.12, shown below, demonstrated visually the low memberships of AAG and AGS compared to other groups.

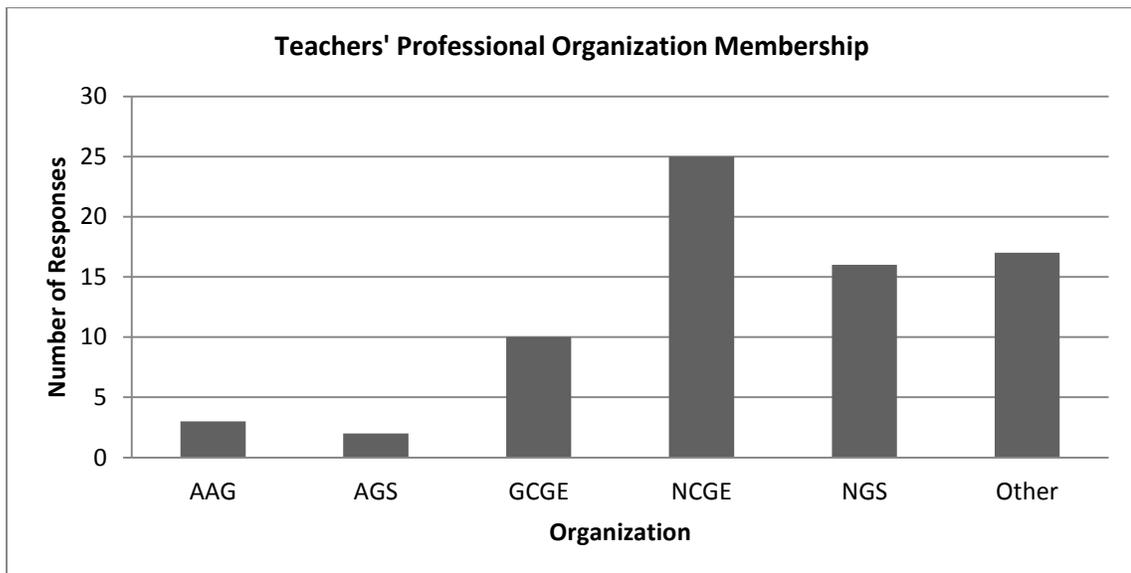


Figure 5.12. Teachers’ Professional Organization Membership

On a scale from 1 to 10, where 1 represents “extreme trust” and 10 represents “no trust at all,” please indicate your trust in the “messages” from academic and professional organizations for the teaching of K-12 geography.

Table 5.13 reports data concerning teachers' trust of organizations. Teachers regarded all of these organizations with higher levels of trust. The "Other" category withstanding, the National Geographic Society had the most trust among teachers with a mean of 2.80. The American Geographical Society had the lowest level of trust with a mean of 3.96. The variances were relatively high for NGS, NCGE, and GCGE. These organizations had modes of 1 with a number of responses indicating "no trust at all" as well. The standard deviations reflected the wide range of dispersion in the datasets.

Table 5.13. Teachers' Trust of Organizations

Likert Item	Mean	Variance	SD (σ)	Responses
AAG	3.69	8.27	2.88	26
AGS	3.96	5.16	2.27	24
GCGE	3.00	22.10	4.70	31
NCGE	3.14	39.07	6.25	42
NGS	2.80	64.94	8.06	45
Other	2.63	11.60	3.41	16
Total	3.17	9.13	3.02	184

Figure 5.13 shows the mean, median, and mode for the trust of organizations in geographic education. The mean value was 3.17; the median value was 1.5; the mode was 1.

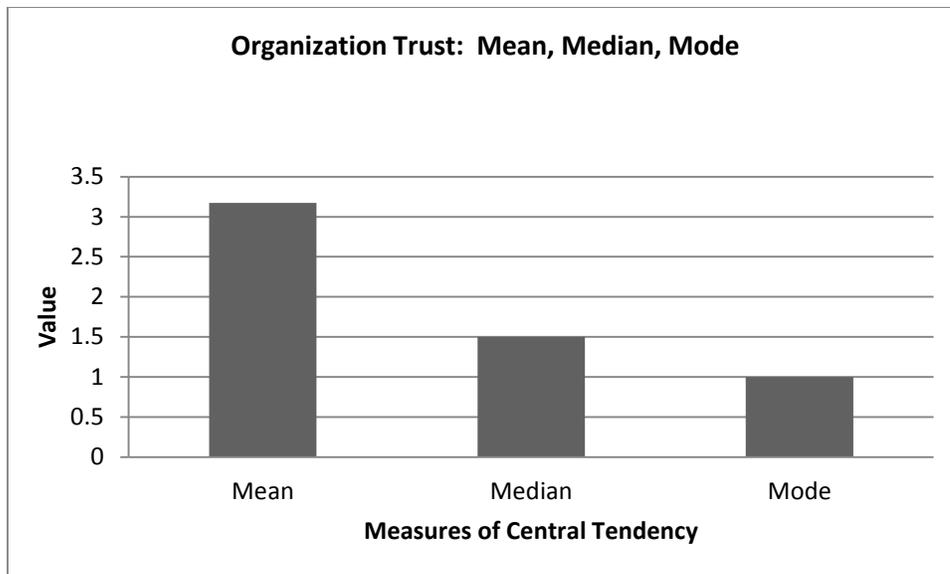


Figure 5.13. Organization Trust: Mean, Median, Mode

Table 5.14, shown below, provided a summary of the questions included in Model Component 3 – “Believing/Trust.” The total number of responses, represented by “N” in the table, varied because certain questions allowed teachers to respond multiple times, thus generating higher than expected N values. The range for each question was 9 as teachers were asked to give responses for each question on a scale from 1 to 10. The standard deviations and variances for each question were relatively small, with Question 3 having the highest variance (12.09) and the highest standard deviation (3.48). The coefficient of variation, represented by “CV” in the table, allowed for comparisons of variability between datasets. Table 5.14 revealed that Question 12 had the greatest amount of variation, compared to the other question. Both questions have coefficients of variation greater than 85. The mode represented the most common answer selected for each question and the most common answer was 1. The standard error, represented by “Std. Error” in the table, demonstrated the amount of variability from the mean. Each question had very small standard error values, ranging from 0.22 to 0.25.

Table 5.14. Model Component 3 – “Believing/Trust” Summary Table

Question	N	Range	Min.	Max	Mean	Std. Dev.	Var.	CV	Mode	Std. Error
3	187	9	1	10	4.05	3.48	12.09	85.89	1	0.25
12	184	9	1	10	3.17	3.02	9.13	95.19	1	0.22

Model Component 4—“Perceiving.” What is the degree to which classroom teachers “perceive” that messages from leaders in geographic education are relevant to their classroom teaching of geography? What is the extent to which teachers perceive that they must adopt and/or incorporate messages into their approaches to teaching?

The communication model component of “perceiving” was examined from questions that asked about the effectiveness of geographic education messages from leaders in geographic education, as well as organization reliance.

On a scale from 1 to 10 where 1 represents “extremely effective” and 10 represents “not effective at all,” please indicate your opinion as to the effectiveness of each of these organizations for disseminating “messages” about the teaching of K-12 geography.

Table 5.15 reports data concerning the effectiveness of professional organizations related to geographic education. Overall, the mean values indicated a mid-level amount of effectiveness in message dissemination. Teachers reported that the National Geographic Society was the most effective in disseminating messages, with a mean value of 3.98. The American Geographical Society was the least effective in disseminating messages, with a mean value of 5.71. The variances and standard deviations were varied. The greatest variances were NCGE (30.93) and NGS (23.82), which indicated a wide amount of dispersion within the dataset.

Table 5.15. Organizations’ Effectiveness of Message Dissemination

Likert Item	Mean	Variance	SD (σ)	Responses
AAG	5.00	5.66	2.38	29
AGS	5.71	5.82	2.41	24
GCGE	4.44	12.18	3.49	32
NCGE	4.07	30.93	5.56	44
NGS	3.98	23.82	4.88	46
Other	4.11	7.51	2.74	18
Total	4.46	12.58	3.55	193

Figure 5.14 shows the mean, median, and mode for the effectiveness of message dissemination of organizations in geographic education. The mean value was 4.46; the median value was 3; the mode was 1.

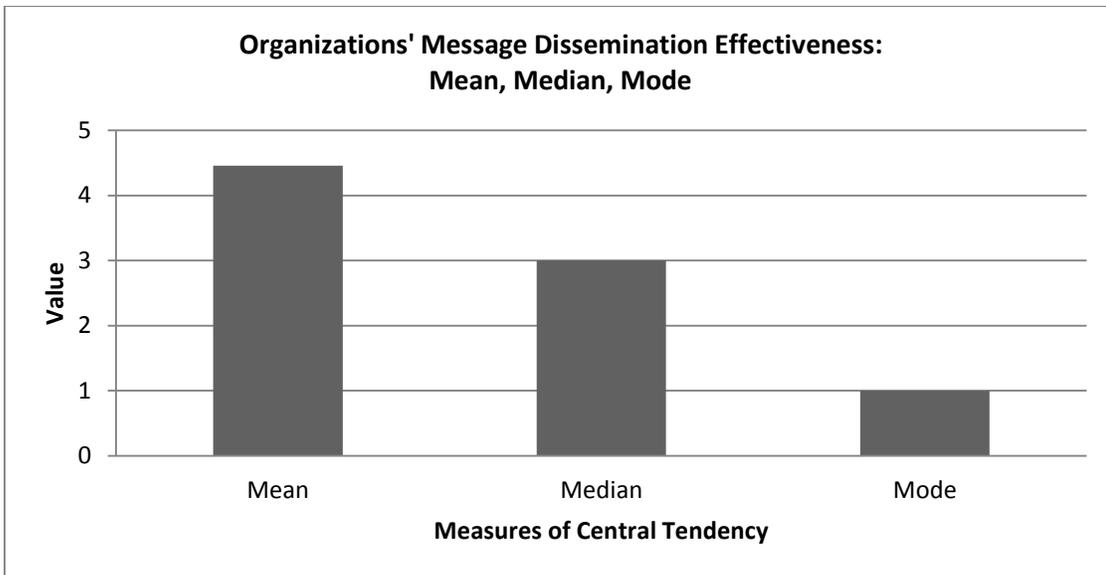


Figure 5.14. Organizations’ Message Dissemination Effectiveness: Mean, Median, Mode

On a scale from 1 to 10 where 1 represents “highly relied on” and 10 represents “not relied on at all,” please indicate which academic and professional organizations you rely on the most for obtaining “messages” about the teaching of K-12 geography.

Table 5.16 reports data concerning teachers' reliance on academic and professional organizations for obtaining messages about the teaching of K-12 geography. The mean values ranged from 3.72 (NGS) to 7.12 (AGS). These mean values indicated a mid-level amount of reliance on organizations for obtaining messages. The overall mean of 4.92 confirmed this mid-level amount of reliance. The variances and standard deviations were fairly high, indicating a wide amount of dispersion among the datasets. The greatest amount of variance was for NGS (34.04).

Table 5.16. Teachers' Reliance on Organizations

Likert Item	Mean	Variance	SD (σ)	Responses
AAG	6.59	12.54	3.54	29
AGS	7.12	12.04	3.47	26
GCGE	5.03	11.56	3.40	30
NCGE	4.05	19.79	4.45	43
NGS	3.72	34.04	5.83	46
Other	4.11	4.54	2.13	19
Total	4.92	13.48	3.67	193

Figure 5.15 shows the mean, median, and mode for the effectiveness of message dissemination of organizations in geographic education. The mean value was 4.92; the median value was 4; the mode was 1.

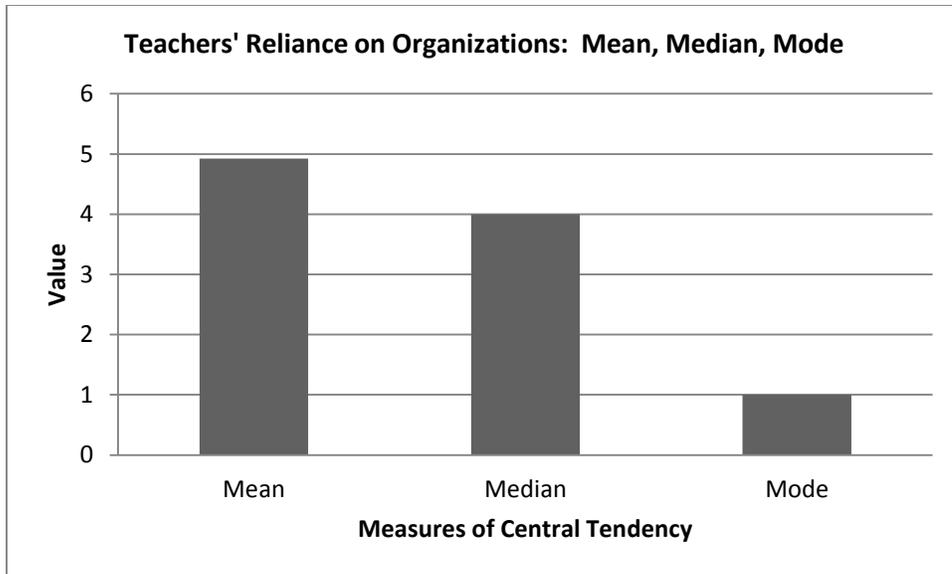


Figure 5.15. Teachers' Reliance on Organizations: Mean, Median, Mode

More recent "messages" from academic and professional organizations encourage teachers to incorporate technology in the classroom for teaching geography, where technology includes electronic "tools" beyond the Internet. On a scale from 1 to 10 where 1 represents "extremely motivated" and 10 represents "not at all motivated," please indicate how motivated you are to incorporate technology beyond the Internet in your teaching of geography.

Table 5.17 demonstrated the degree of motivation teachers had for incorporating technology into their classrooms beyond the Internet. The mean value was 3.20, indicating that teachers were motivated to incorporate technology into their classrooms. The variance and standard deviation indicated a moderate amount of dispersion in the dataset. Sixty-four teachers responded to this item.

Table 5.17. Teachers' Degree of Motivation to Incorporate Technology

Likert Item	Mean	Variance	SD (σ)	Responses
Degree of Motivation	3.20	5.40	2.32	64

The next question, which was a follow-up to the previous question, was a free-response question and will be examined in the qualitative analysis.

Table 5.18, shown below, provides a summary of the questions included in Model Component 4 – “Perceiving.” The total number of responses, represented by “N” in the table, varied because certain questions allowed teachers to respond multiple times, thus generating higher than expected N values. The range for each question was 9 as teachers were asked to give responses for each question on a scale from 1 to 10. The standard deviations and variances for each question were relatively low, with Question 11 having the highest variance (13.48) and the highest standard deviation (3.67). The coefficient of variation, represented by “CV” in the table, allowed for comparisons of variability between datasets. Table 5.18 revealed that Question 10 had the greatest amount of variation, compared to the other questions. Each question had a coefficient of variation greater than 72. The mode represented the most common answer selected for each question and the most common answer was 1. The standard error, represented by “Std. Error” in the table, demonstrated the amount of variability from the mean. Each question had very small standard error values, ranging from 0.25 to 0.29.

Table 5.18. Model Component 4 – “Perceiving” Summary Table

Question	N	Range	Min.	Max	Mean	Std. Dev.	Var.	CV	Mode	Std. Error
10	193	9	1	10	4.45	3.55	12.58	79.79	1	0.25
11	193	9	1	10	4.92	3.67	13.48	74.59	1	0.26
18	64	9	1	10	3.20	2.32	5.40	72.57	1	0.29

Model Component 5—“Confirming.” This section examines whether colleagues influence their attitudes, beliefs, and perceptions of how to teach geography in the classroom (i.e., “confirmation”).

This model component featured one question, which aimed to understand how often teachers discuss messages disseminated by organizations with other teachers, friends, and colleagues.

In general, when you hear, or learn about any kind of geographic education “messages” disseminated by national academic or professional organizations about the teaching of K-12 geography, do you discuss the information with your friends or colleagues?

Table 5.19 reports data concerning teachers’ discussions with friends or colleagues. The mean value (2.75) suggested a mid-level amount of discussion with friends or colleagues. The variance and standard deviations were smaller and indicated a narrower amount of dispersion in the dataset.

Table 5.19. Model Component 5 – “Confirming” Summary Table

Question	N	Range	Min.	Max	Mean	Std. Dev.	Var.	CV	Mode	Std. Error
17	64	4	1	5	2.75	0.99	0.98	36.07	3	0.12

Figure 5.16, shown below, presents the mean, median, and mode for how often teachers discuss messages with friends or colleagues. The mean value was 2.75; the median value was 3; the mode was 3.

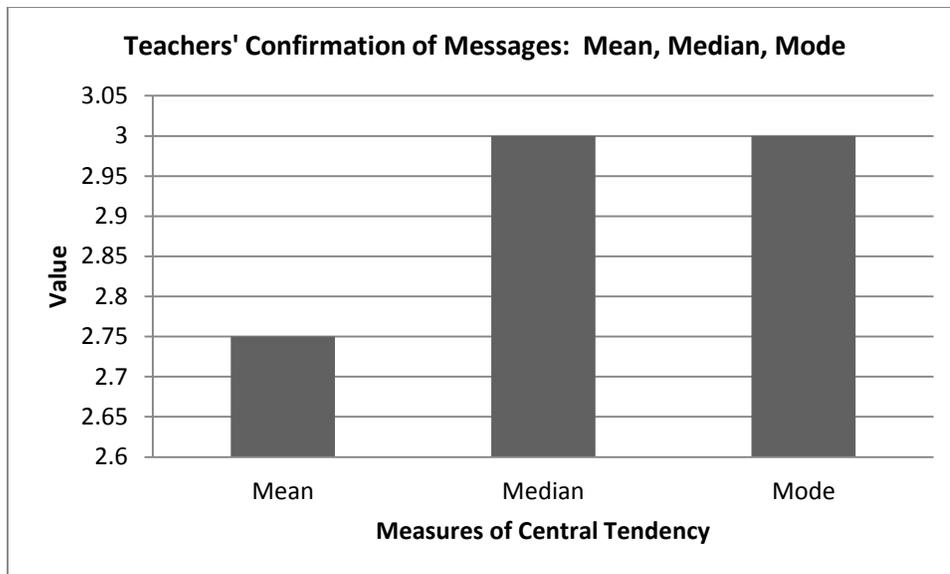


Figure 5.16. Teachers' Confirmation of Messages: Mean, Median, Mode

Model Component 6—“Acceptance/Acting.” What is the actual degree of acceptance of approaches and action to change ways to teach geography after “hearing” or learning new information disseminated from leaders in geographic education.

The communication model component of “acting” were examined from questions that asked about teachers’ actions related to messages disseminated from leaders in geographic education, including use and incorporation.

On a scale from 1 to 10 where 1 represents “very frequently used” and 10 represents “not used at all,” please indicate which publications you use the most for teaching K-12 geography.

Table 5.20 reports data on levels of usage/frequency of publications related to the teaching of K-12 geography. The mean values between 6.15 and 7.26 indicated middle-to lower-range levels of usage of these documents. In particular, levels of usage were highest for messages in the publications, *Geography for Life – National Geography Standards, Second Edition* and *Why Geography is Important*. Levels of usage were lowest for messages in the publications, *Learning to Think Spatially* and *A Road Map for 21st Century Geography Education*. The variances and standard deviations were

generally high, indicating a wide amount of dispersion among the datasets. The number of responses was 283 as teachers were able to respond to each Likert item in the question.

Table 5.20. Teachers’ Frequency of Usage of Messages

Likert Item	Mean	Variance	SD (σ)	Responses
GGE	6.46	35.38	5.95	46
GFL	6.57	19.16	4.38	44
LTS	7.26	39.51	6.29	38
GFL2	6.15	19.12	4.37	47
WGI	6.26	17.21	4.15	39
RM21	7.16	39.73	6.30	38
Other	7.10	25.88	5.09	31
Total	6.67	13.61	3.69	283

Figure 5.17, shown below, presents the mean, median, and mode for how often teachers discussed messages with friends or colleagues. The mean value was 6.67; the median value was 9; the mode was 10.

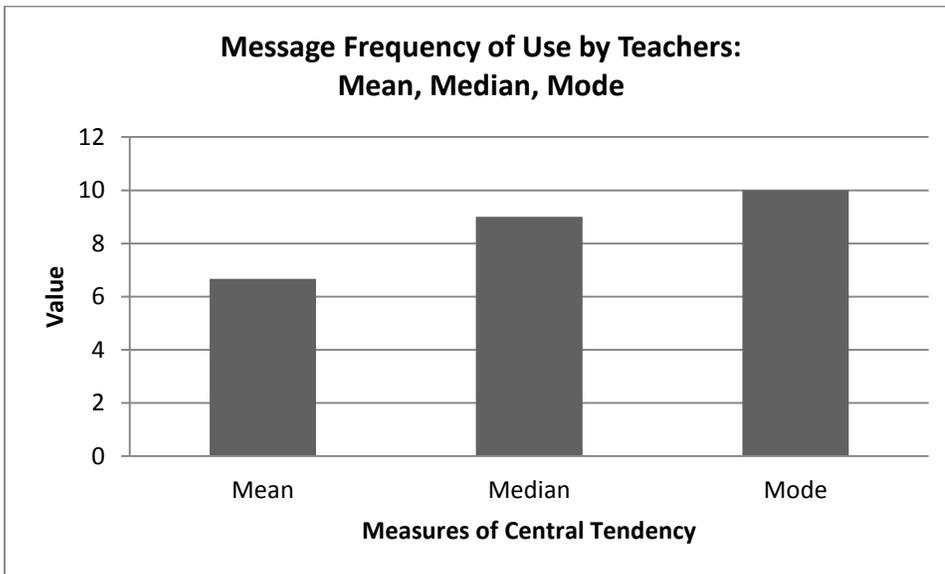


Figure 5.17. Message Frequency of Use by Teachers: Mean, Median, Mode

On a scale from 1 to 10 where 1 represents “I always incorporate” and 10 represents “I never incorporate,” please indicate the degree to which you incorporate “messages” of any kind from these geographic education publications in your geography teaching.

Table 5.21 reports data on levels of message incorporation into geography teaching. The mean values between 4.42 and 5.57 indicated mid-levels of incorporation. In particular, levels of incorporation were highest for *Geography for Life – National Geography Standards, Second Edition, Guidelines for Geographic Education*, and *Why Geography is Important*. The level of incorporation was lowest for *Learning to Think Spatially*. The variances and standard deviations were relatively low, indicating a narrow band of dispersion among the datasets. The number of responses totaled 206 as teachers were able to respond to each Likert item in the question.

Table 5.21. Teachers’ Incorporation of Messages into Teaching

Likert Item	Mean	Variance	SD (σ)	Responses
GGE	4.46	7.39	2.72	35
GFL	4.78	8.90	2.98	37
LTS	5.57	3.34	1.83	23
GFL2	4.42	13.82	3.72	36
WGI	4.52	7.21	2.69	31
RM21	4.96	5.39	2.32	25
Other	4.68	3.66	1.91	19
Total	4.72	11.28	3.36	206

Figure 5.18, shown below, presents the mean, median, and mode for how often teachers discussed messages with friends or colleagues. The mean value was 4.72; the median value was 4; the mode was 1.

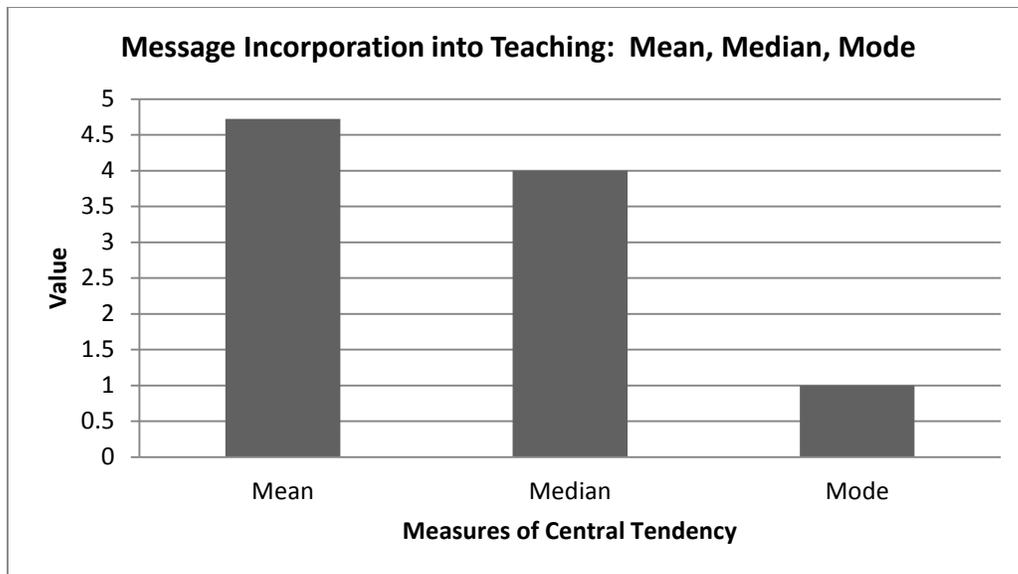


Figure 5.18. Message Incorporation into Teaching: Mean, Median, Mode

On a scale from 1 to 10 where 1 represents “I always incorporate” and 10 represents “I never incorporate,” please indicate the degree to which you incorporate “messages” of any kind from these geographic education academic and professional organizations in your geography teaching.

Table 5.22 reports data on levels of geography organization message incorporation into geography teaching. The mean values between 3.93 and 6.26 indicated mid-levels of incorporation. In particular, levels of incorporation were highest for the “Other” category (for the most part represented by the Texas Alliance for Geographic Education) and National Geographic Society. The level of incorporation was lowest for the Association of American Geographers and the American Geographical Society. The variances and standard deviations were relatively small, indicating a narrow band of dispersion among the datasets, except for the National Geographic Society and the National Council for Geographic Education. Those variances and standard deviations were higher than the rest, indicating a wider dispersion of data. The number of responses totaled 189 as teachers were able to respond to each Likert item in the question.

Table 5.22. Teachers’ Incorporation of Organizations’ Messages

Likert Item	Mean	Variance	SD (σ)	Responses
AAG	6.26	5.34	2.31	27
AGS	6.17	6.71	2.59	24
GCGE	5.48	5.88	2.42	29
NCGE	4.33	10.06	3.17	45
NGS	3.94	22.54	4.75	49
Other	3.93	3.61	1.90	15
Total	4.88	11.53	3.40	189

Figure 5.19, shown below, presents the mean, median, and mode for how often teachers discuss messages with friends or colleagues. The mean value was 4.88; the median value was 4; the mode was 1.

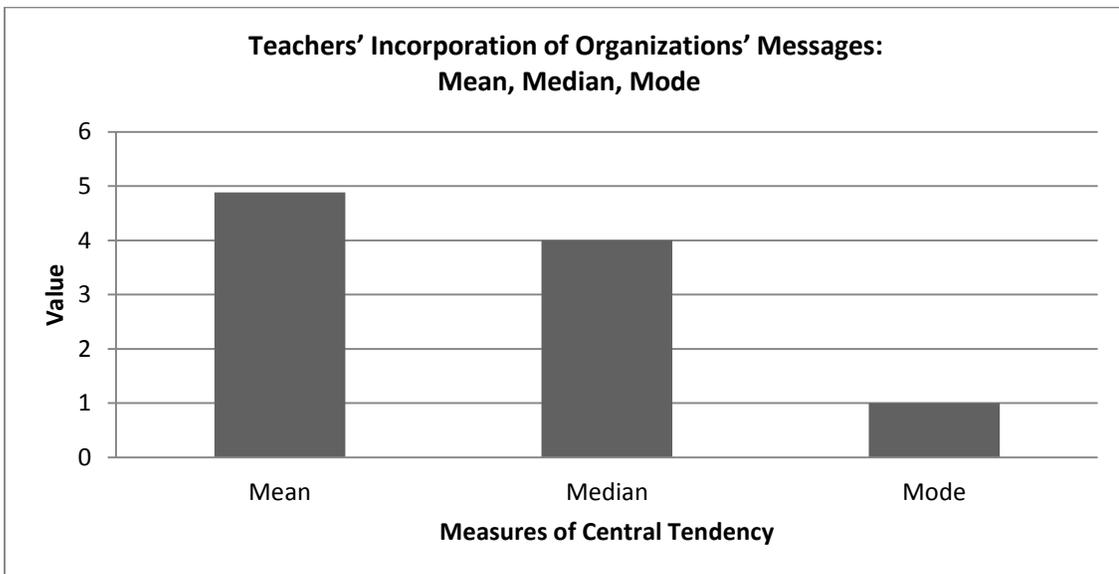


Figure 5.19. Teachers’ Incorporation of Organizations’ Messages: Mean, Median, Mode

Table 5.23, shown below, provides a summary of the questions included in Model Component 6 – “Acceptance/Acting.” The total number of responses, represented by “N” in the table, varied because certain questions allowed teachers to respond multiple times, thus generating higher than expected N values. The range for each question was 9

as teachers were asked to give responses for each question on a scale from 1 to 10. The standard deviations and variances for each question were relatively small, with Question 2 having the highest variance (13.61) and the highest standard deviation (3.69). The coefficient of variation, represented by “CV” in the table, allowed for comparisons of variability between datasets. Table 5.23 revealed that Question 6 had the greatest amount of variation, compared to the other questions. Each question had a coefficient of variation greater than 55. The mode represents the most common answer selected for each question and the most common answer for Question 2 was 10, while the most common answer for Questions 6 and 13 was, 1. The standard error, represented by “Std. Error” in the table, represents the amount of variability from the mean. Each question had very small standard error values, ranging from 0.22 to 0.25.

Table 5.23. Model Component 6 – “Acceptance/Action” Summary Table

Question	N	Range	Min.	Max	Mean	Std. Dev.	Var.	CV	Mode	Std. Error
2	283	9	1	10	6.67	3.69	13.61	55.32	10	0.22
6	206	9	1	10	4.72	3.36	11.28	71.12	1	0.23
13	189	9	1	10	4.88	3.40	11.53	69.53	1	0.25

Other Factors Reported by Teachers toward Acceptance and Action on Messages from Leaders in Geographic Education

This section included those questions not specifically linked to components of the communication model. It also included questions related to participation in the additional voluntary qualitative phone interview.

Approximately how many years have you been teaching geography? (Please enter a numeric value. For example, “6” rather than “six.”)

Table 5.24 reports data regarding the number of years that teachers have taught geography. The mean number of years teaching geography was 14.34. The 58 responses had a range of 40 years. The variance and standard deviation were high, reflecting the large range of responses. The coefficient of variance indicated a high amount of dispersion as well. The standard error (1.29) represented the amount of variability from the mean.

Table 5.24. Teachers' Years Teaching Geography Summary Table

Question	N	Range	Min.	Max	Mean	Std. Dev.	Var.	CV	Mode	Std. Error
20	58	40	0	40	14.34	9.86	97.14	68.71	10	1.29

Figure 5.20, shown below, presents the mean, median, and mode for the number of years teachers have taught geography. The mean value was 14.34; the median value was 11.5; the mode was 10.

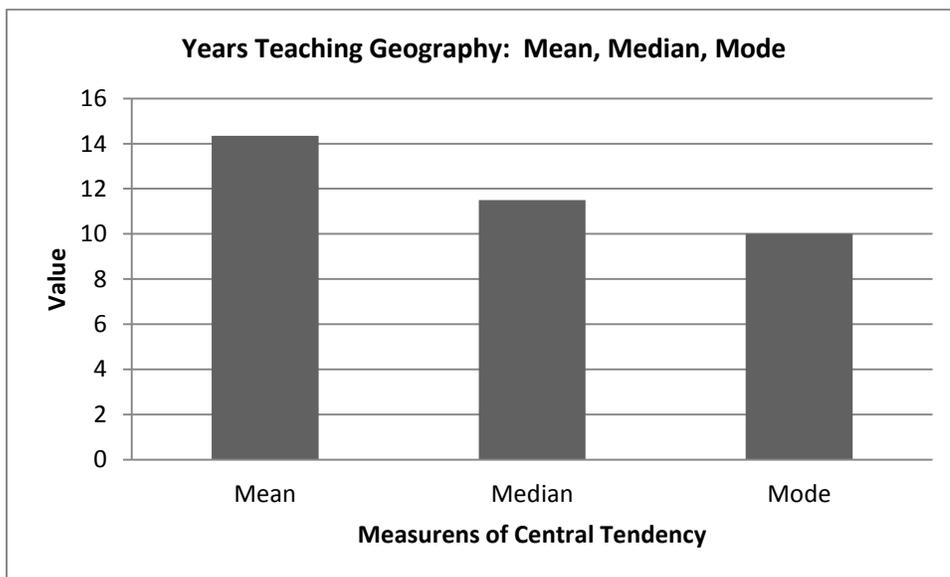


Figure 5.20. Years Teaching Geography: Mean, Median, Mode

Please select the grades in which you teach geography courses (check all that apply).

Table 5.25 reports data concerning the grades in which teachers taught geography courses. Forty-six (72%) respondents taught 9th grade geography; 16 (25%) taught 6th grade geography; 6 (9%) taught 12th grade geography; 23 (36%) taught other grades. The total number of responses was 91, indicating that some of the 64 teachers who responded taught more than one grade level.

Table 5.25. Grades in which Teachers Teach Geography Courses

Likert Item	Responses	Percentage (%)
6 th Grade	16	25
9 th Grade	46	72
12 th Grade	6	9
Other Grade(s)	23	36

Figure 5.21 reveals that 43 teachers taught one geography course, 15 teachers taught two geography courses, and 6 teachers taught three geography courses.

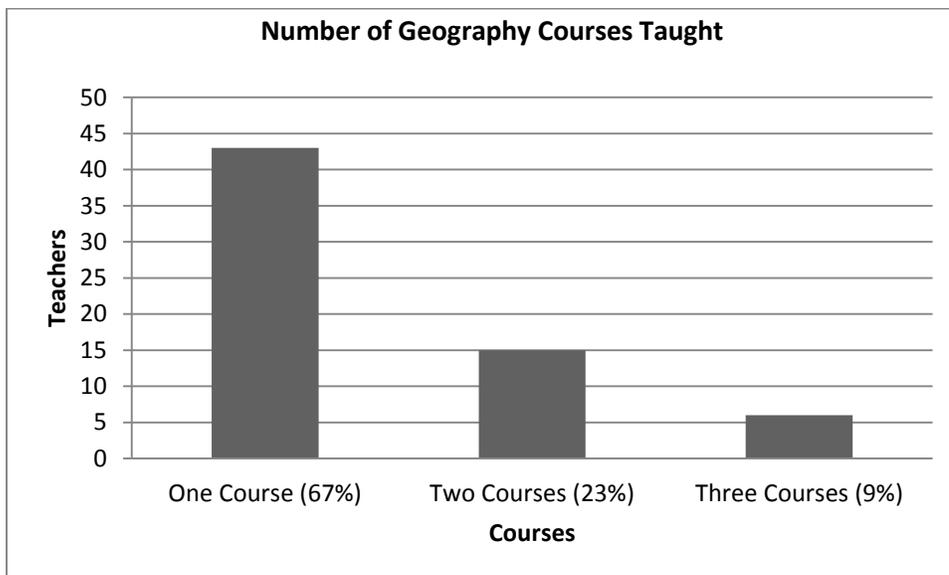


Figure 5.21. Number of Geography Courses Taught

What geography course(s) have you taught? (Select all that apply).

Table 5.26 reports data concerning the geography courses taught by teachers. Fifty teachers (82%) taught World Geography Studies; 13 teachers (21%) taught Advanced Placement (AP) Human Geography; 12 teachers (20%) taught Contemporary World Cultures; 21 teachers (34%) taught other courses.

Table 5.26. Geography Courses Taught by Teachers

Likert Item	Responses	Percentage (%)
Contemporary World Cultures	12	20
World Geography Studies	50	82
Advanced Placement (AP) Human Geography	6	9
Other Course(s)	23	36

How often do you attend geography-related professional development training?

Figure 5.22, shown below, reports that 26 teachers (41%) attended geography-related professional development training “more than once a year.” Twenty-one teachers (33%) attended professional development “once a year.” Twelve teachers (19%) attended professional development “once every couple of years.” Five teachers (8%) reported they never attended geography-related professional development training.

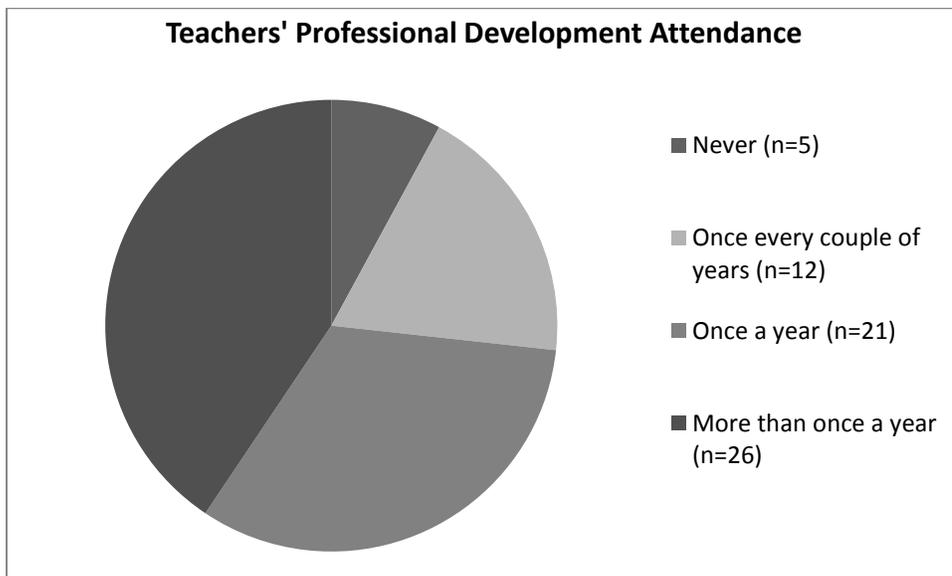


Figure 5.22. Teachers' Professional Development Attendance

Please indicate your gender.

Figure 5.23, shown below, indicates that 48 teachers (76%) were female and 15 teachers (24%) were male.

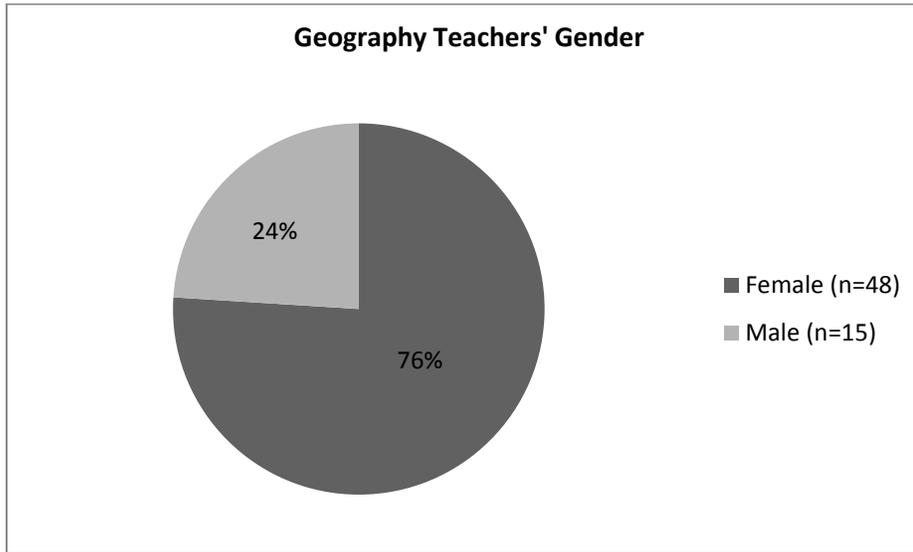


Figure 5.23. Geography Teachers' Gender

Please indicate your age range.

Figure 5.24, shown below, revealed that 26 teachers (41%) were 51 years old or older; 25 teachers (39%) were 41 to 50 years old; 10 teachers (16%) were 31 to 40 years old; 3 teachers (5%) were 21 to 30 years old; zero (0%) teachers reported being 20 years old or younger. The total number of responses for this question was 64, indicating that two respondents did not answer this particular question.

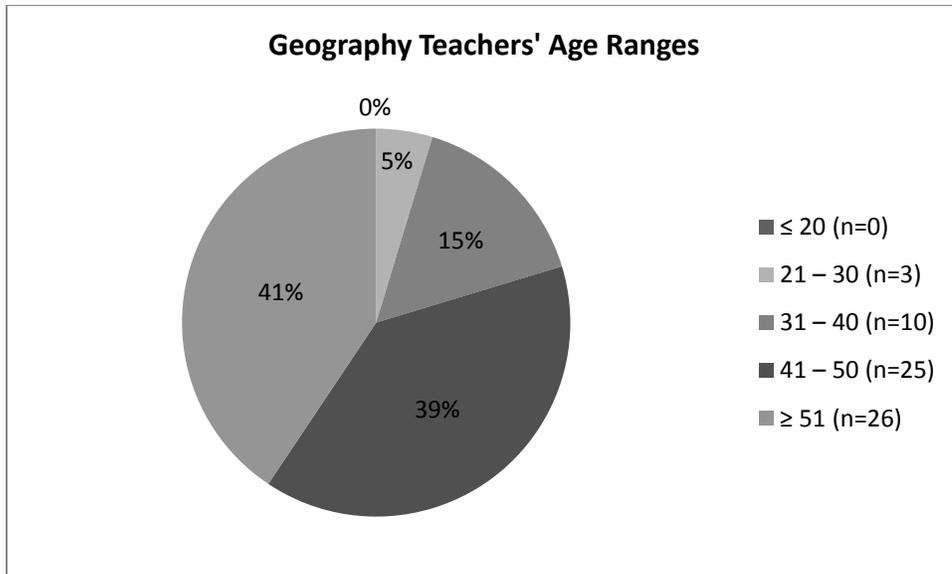


Figure 5.24. Geography Teachers' Age Ranges

Would you be willing to participate in an additional phone interview to discuss your experiences and opinions of education communication messages regarding the teaching of K-12 geography disseminated in formal documents and/or by academic and professional organizations on the teaching of geography?

Figure 5.25, below, indicates that 31 teachers (48%) were willing to participate in the qualitative interview. Conversely, 33 teachers (52%) declined to participate in the qualitative interview portion.

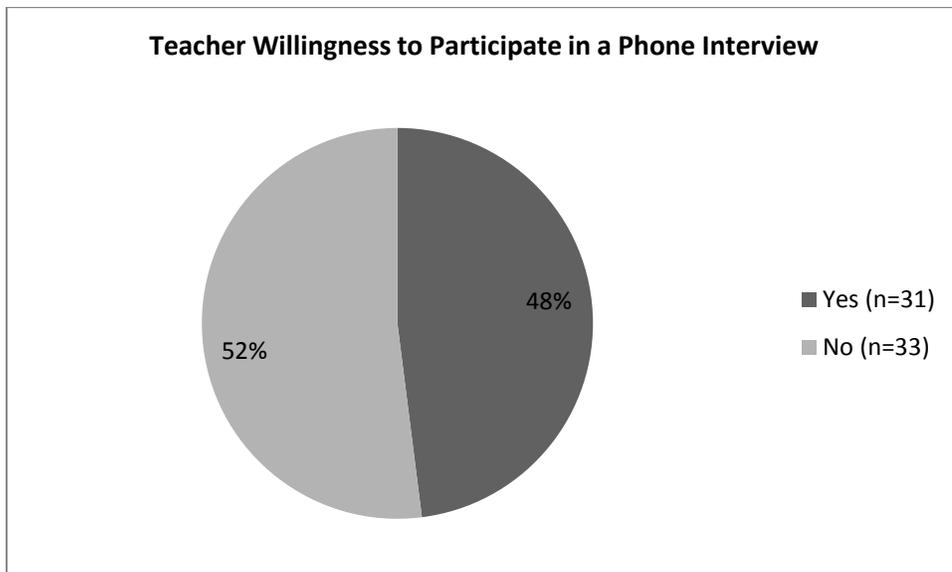


Figure 5.25. Teacher Willingness to Participate in a Phone Interview

The last survey item was only revealed to those teachers who responded to Question 26 with “Yes.” This survey item asked teachers to provide their e-mail addresses as the first point of contact for the researcher to setup phone interviews. Of the 31 teachers who responded to Question 26 with “Yes,” 28 provided their e-mail addresses.

CHAPTER 6

EXPLORING RELATIONSHIPS AMONG THE COMPONENTS OF THE GEOGRAPHIC EDUCATION COMMUNICATION MODEL

The aim of this chapter was to focus on the two main behavioral elements of the education communication model – “hearing” and “acting” – to, first, discover the strength of the associations between “hearing” and “acting” with other elements of the model, and, second, to define a predictive model for “hearing” and “acting” given the interactions of the variables that comprised the model components. To accomplish the first task, chi-square tests of independence were performed to explore associations, which proved useful for the second task of employing logistic regression to define a predictive model for “hearing” and, then, “acting.”

Measures of Association – Chi-Square

Chi-square tests of independence were performed to explore the relationships first, between the behavior of “hearing” and variables comprising each component of the geographic education communication model, and second, between “acting” and variables comprising the components of the model. The chi-square test of independence is a test that allows the researcher to determine whether or not two variables are “associated” in some way, or not (Burt et al., 2009; Caldwell, 2010). In the education communication model, the chi-square test allowed the researcher to investigate questions posed earlier in the research, such as:

- 1) To what extent is there an association between teachers’ “hearing,” or “being familiar” with messages and general understandability of the content of messages?

- 2) To what extent is there an association between teachers' "hearing" and "understanding" of whether the messages are applicable to state standards?
- 3) To what extent is there an association between teachers' "hearing" a message and "confirming," or discussing messages with colleagues/co-workers?
- 4) To what extent is there an association between teachers' "actions" of incorporating the message in the classroom and "believing," or trusting the source of the message?
- 5) To what extent is there an association between teachers' actions and "perceiving" that the message was disseminated effectively from the message source?
- 6) To what extent is there an association between teachers' familiarity with messages, that is, "hearing" and "acting" on those messages by incorporating them in classroom teaching?

In order to set up the two by two contingency tables for chi-square tests, it was necessary to recode the Likert-type questions—originally having a minimum value of 1 and a maximum value of 10—into binary categories. The responses were combined into two categories: 1 through 5 and 6 through 10. This binning process resulted in the creation of the two by two contingency tables.

The chi-square test of independence begins with a null hypothesis stating that two variables are unrelated, or independent of each other. Since the chi-square test of independence examines the differences between the observed and expected counts, a large chi-square value will reflect a greater difference between observed and expected counts, and imply that the observed and expected counts do not closely agree, and therefore, that the hypothesis of independence is false (McClave and Benson ,1982). In other words, a larger chi-square value that exceeds a critical value will indicate that the two tested variables are statistically significant and associated in some way (Caldwell 2010).

The analysis also included additional statistics such as, the Pearson chi-square statistic determined whether variables were independent or not. The Yates' Correction for Continuity made adjustments for overestimations of chi-square values for two by two contingency tables. Phi and Cramer's V values were measures that indicated the strength of the association between categorical variables (Field 2009). [Phi is used for two by two contingency tables whereas Cramer's V is flexible in that it indicates strengths between variables with more than two variables.] The significance values were also observed. When the significance values met a required threshold—for instance, at $p < 0.05$)—the alternative hypothesis was chosen which concluded that the variables were likely related in some manner.

Each component of the geographic education communication model—*hearing*, *understanding*, *believing*, *perceiving*, *confirming*, and *acting*—was subjected to chi-square test of independence analyses. Based on the theoretical literature, *hearing* and *acting* represented latent dependent variables and were examined against the remaining variables. *Hearing* was represented by Question 1 (message familiarity) while *acting* was represented by Question 2 (message use).

“Hearing” and Results of Chi-Square Tests of Independence

The first component, “Hearing,” is summarized in Table 6.1, below. The first chi-square tests examined *hearing* against *understanding*, where *understanding* was represented by Questions 4, 5, and 14. Question 4 asked about teachers' message understandability. The chi-square test revealed $\chi^2 = 11.08$ with 1 degree of freedom. This value was greater than the critical value of 6.635 at $p < .01$, meaning the null hypothesis stating that the variables were unrelated should be rejected, further,

confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.437) indicated that there was a strong association between the variables. Question 5 asked about message application to state standards. The chi-square test revealed $\chi^2 = 6.49$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.337) further indicated that there was a strong association between the variables. Question 14 asked about organizations' awareness of state standards. The chi-square test revealed $\chi^2 = 14.46$ with 1 degree of freedom. This value was greater than the critical value of 6.635 at $p < .01$, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.491) further indicated that there was a strong relationship between the variables.

The second group of chi-square tests examined *hearing* against *believing*, where *believing* was represented by Questions 3 and 12. Question 3 asked about teachers' trust of messages. The chi-square test revealed $\chi^2 = 14.95$ with 1 degree of freedom. This value was greater than the critical value of 6.635 at $p < .01$, meaning that the null hypothesis stating that the variables were unrelated should be rejected, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.495) further indicated that there was a strong relationship between the variables. Question 12 asked about teachers' trust of organizations. The chi-square test revealed $\chi^2 = 4.80$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, confirming that there was a statistically significant relationship

between the variables. The Phi and Cramer's V values (.285) further indicated that there was a strong relationship between the variables.

The third group of chi-square tests examined *hearing* against *perceiving*, where *perceiving* was represented by Questions 10 and 11. Question 10 asked about organizations' dissemination effectiveness. The chi-square test revealed $\chi^2 = 8.79$ with 1 degree of freedom. This value was greater than the critical value of 6.635 at $p < .01$, meaning the null hypothesis stating that the variables are unrelated should be rejected, confirming that there is a statistically significant relationship between the variables. The Phi and Cramer's V values (.380) further indicated that there was a strong relationship between the variables. Question 11 asked about teachers' reliance on organizations. The chi-square test revealed $\chi^2 = 4.71$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.283) further indicated that there was a strong relationship between the variables.

The fourth group of chi-square tests examined *hearing* against *confirming*, where *confirming* was represented by Question 17. Question 17 asked about the frequency of teachers' message confirmation with colleagues. The chi-square test revealed $\chi^2 = 1.87$ with 2 degrees of freedom. This value was less than the critical value of 5.991 at $p < .05$, which indicated failure to reject the null hypothesis that the variables are unrelated.

The fifth group of chi-square tests examined *hearing* against *acting*, where *acting* was represented by Questions 2, 6, and 13. Question 2 asked about the frequency of message use. The chi-square test revealed $\chi^2 = 8.30$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, meaning the null hypothesis

stating that the variables were unrelated should be rejected, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.363) indicated that there was a strong relationship between the variables.

Question 6 asked about teachers' message incorporation into teaching. The chi-square test revealed $\chi^2 = 8.57$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.384) further indicated that there was a strong relationship between the variables. Question 13 asked about organization message incorporation into teaching. The chi-square test revealed $\chi^2 = 9.60$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .0$, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.400) further indicated that there was a strong relationship between the variables.

The summary table (Table 6.1) reports the N values ranging from 58 to 63. All of the model component questions had 1 degree of freedom with the exception of Question 17, which had 2 degrees of freedom. The Yate's Continuity Corrections accounted for Type I errors and is included in the table, however it is not discussed (Field 2009). The significance values varied between questions and model components and are explained with the note at the bottom of the table.

Table 6.1. Summary of Associations of "Hearing"⁺ Messages and Components of the Education Communication Model for K-12 Geography Teachers

Model Component	Pearson Chi-Square	Sig.	Continuity Correction	Sig.	Phi	Sig.	Cramer's V	Sig.	N	DF
Understanding Q4	11.08	.001 ***	8.78	.003 **	.437	.001 ***	.437	.001 ***	58	1

Table 6.1-Continued										
Model Component	Pearson Chi-Square	Sig.	Continuity Correction	Sig.	Phi	Sig.	Cramer's V	Sig.	N	DF
Believing Q3	14.95	.000 ***	12.43	.000 ***	.495	.000 ***	.495	.000 ***	61	1
Believing Q12	4.80	.028 *	3.31	.069	.285	.028 *	.285	.028 *	59	1
Perceiving Q10	8.79	.003 **	6.85	.009 *	.380	.003 **	.380	.003 **	61	1
Perceiving Q11	4.71	.030 *	3.33	.068	.283	.030 *	.283	.030 *	59	1
Confirming Q17	1.87	.393	N/A	N/A	.171	.393	.171	.393	64	2
Acting Q2	8.30	.004 **	6.55	0.10	.363	.004 **	.363	.004 **	63	1
Acting Q6	8.57	.003 **	6.51	0.11	.384	.003 **	.384	.003 **	58	1
Acting Q13	9.60	.002 **	7.55	.006 **	.400	.002 **	.400	.002 **	60	1

+ where "Hearing" is represented by Q1, familiarity with messages, chi-square test for independence
*.05 level of significance, **.01 level of significance, ***.001 level of significance

"Acting" and Results of Chi-Square Tests of Independence

The "Acting" component of the Education Communication Model for K-12 Geography Teachers was subjected to the same chi-square analyses as the "Hearing" component—Table 6.2 summarizes the results. The first group of chi-square tests examined *acting* against *hearing*, where *hearing* was represented by Questions 1 and 8. Question 1 asked about message familiarity. The chi-square test revealed $\chi^2 = 8.57$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, meaning that the null hypothesis stating that the variables were unrelated should be rejected, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.384) further indicated that there was a strong relationship between the variables. Question 8 asked about teachers' familiarity with professional organizations. The chi-square test revealed $\chi^2 = 7.03$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, confirming

that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.348) further indicated that there was a strong relationship between the variables.

The second group of chi-square tests examined *acting* against *understanding*, where understanding was represented by Questions 4, 5, and 14. Question 4 asked about message understandability. The chi-square test revealed $\chi^2 = 11.52$ with 1 degree of freedom. This value was greater than the critical value of 6.635 at $p < .01$, meaning the null hypothesis stating that the variables are unrelated should be rejected, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.450) further indicated there was a strong relationship between the variables. Question 5 asked about message application to state standards. The chi-square test revealed $\chi^2 = 7.82$ with 1 degree of freedom. This value was greater than the critical value of 6.635 at $p < .01$, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.370) further indicated that there was a strong relationship between the variables. Question 14 asked about organizations' awareness of state standards. The chi-square test revealed $\chi^2 = 6.56$ with 1 degree of freedom. This value is greater than the critical value of 3.841 at $p < .05$, confirming that there is a statistically significant relationship between the variables. The Phi and Cramer's V values (.336) further indicated there was a strong relationship between the variables.

The third group of chi-square tests examined *acting* against *believing*, where *believing* was represented by Questions 3 and 12. Question 3 asked about teachers' trust of messages. The chi-square test revealed $\chi^2 = 15.85$ with 1 degree of freedom. This

value was greater than the critical value of 6.635 at $p < .01$, meaning the null hypothesis stating that the variables were unrelated should be rejected, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.523) further indicated there was a strong relationship between the variables. Question 12 asked about teachers' trust of professional organizations. The chi-square test revealed $\chi^2 = 4.42$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.281) further indicated that there was a strong relationship between the variables.

The fourth group of chi-square tests examined *acting* and *perceiving*, where *perceiving* was represented by Questions 10 and 11. Question 10 asked about organizations' dissemination effectiveness. The chi-square test revealed $\chi^2 = 8.68$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, meaning the null hypothesis stating that the variables were unrelated should be rejected, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.387) further indicated that there was a strong relationship between the variables. Question 11 asked about teachers' organization reliance. The chi-square test revealed $\chi^2 = 9.36$ with 1 degree of freedom. This value was greater than the critical value of 3.841 at $p < .05$, confirming that there was a statistically significant relationship between the variables. The Phi and Cramer's V values (.409) further indicated that there was a strong relationship between the variables.

The fifth group of chi-square tests examined *acting* against *confirming*, where *confirming* was represented by Question 17. Question 17 asked about teachers'

frequency of message confirmation with colleagues. The chi-square test revealed $\chi^2 = 5.60$ with 2 degrees of freedom. This value was less than the critical value of 5.991 at $p < .05$, which indicated failure to reject the null hypothesis that the variables were unrelated. The summary table (Table 6.2) reports the N values ranging from 56 to 58. All of the model component questions had 1 degree of freedom with the exception of Question 17, which had 2 degrees of freedom. Yate's Continuity Corrections is included, but not discussed.

Table 6.2. Summary of Associations of “Acting Upon”⁺⁺ Messages and Components of the Education Communication Model for K-12 Geography Teachers

Model Component	Pearson Chi-Square	Sig.	Continuity Correction	Sig.	Phi	Sig.	Cramer's V	Sig.	N	DF
Hearing Q1	8.57	.003 **	6.51	0.11	.384	.003 **	.384	.003 **	58	1
Hearing Q8	7.03	.008 **	4.04	.044 *	.348	.008 **	.348	.008 **	58	1
Understanding Q4	11.52	.001 ***	9.58	.002 **	.450	.001 ***	.450	.001 ***	57	1
Understanding Q5	7.82	.005 **	6.24	.012 *	.370	.005 **	.370	.005 **	57	1
Understanding Q14	6.56	.010 **	5.04	.025 *	.336	.010 **	.336	.010 **	58	1
Believing Q3	15.85	.000 ***	13.63	.000 ***	.523	.000 ***	.523	.000 ***	58	1
Believing Q12	4.42	.036 *	3.09	.079	.281	.036 *	.281	.036 *	56	1
Perceiving Q10	8.68	.003 **	6.94	.008 **	.387	.003 **	.387	.003 **	58	1
Perceiving Q11	9.36	.002 **	7.52	.006 **	.409	.002 **	.409	.002 **	56	1
Confirming Q17	5.60	.061	N/A	N/A	.311	.061	.311	.061	58	2

⁺⁺ where “Acting Upon” is represented by Q6, incorporation of messages, chi-square test for independence

*.05 level of significance, **.01 level of significance, ***.001 level of significance

Defining a Model for “Hearing” and “Acting” – Linear Multiple Regression

Multiple regression allows for the creation of a predictive model in which a dependent variable is tested against a set of explanatory (or, independent) variables to

determine the combination of independent variables that determine the best fit. In this study, two linear multiple regression runs were completed. Forced entry regression was employed based on statistically significant results from chi-square tests, and from the researcher's knowledge of the literature. Additionally, forced entry does not rely on the sequence of predictor entry into the model as compared with hierarchical methods (Field 2009).

The purpose of the first regression was to define a set of independent variables (a model) that would produce the most statistically significant set of variables associated with the dependent variable of "Hearing" messages, while the purpose of the second regression was to define a set of explanatory variables (a model) that would produce the most statistically significant set of variables (a model) that would predict, "Acting." The first regression tests featured 36 runs of logical combinations of variables that might be the best predictors. These predictors were the questions that best represented each component of the communication model. However, each run produced results with extremely high standardized Beta values, indicating potential overlap with other independent predictors. The survey questionnaire produced measures that allowed for the construction of dichotomous dependent variables, through the process of binning the 1 to 10 scale answers into two larger categories (1 to 5 and 6 to 10).

The set of independent variables, or model, that had the most statistically significant predictor variables for "Hearing," messages is shown in Table 6.3. This run established "Hearing" model component Question 1 (teacher familiarity with messages) as the dependent variable. The remaining model components were included as independent variables. The "Understanding" component was represented by Question 14

(organization awareness of state standards); the “Believing” component was represented by Question 12 (teachers’ trust of organizations); the “Perceiving” component was represented by Question 11 (teachers’ reliance on organizations); the “Confirming” component was represented by Question 17 (teachers’ confirming with colleagues); the “Acting” component was represented by Question 6 (teachers’ incorporation of messages into teaching). The Beta column reveals that Question 14 made the strongest unique contribution to explaining the dependent variable, Question 1.

The significance value for Question 14 was less than $p < .05$, making it statistically significant. The Beta value of Question 6 indicated that it made the second strongest unique contribution to explaining the dependent variable. The significance value was also less than $.05$, making it statistically significant, as well. These two variables made significant and unique contributions to the prediction of the model. The variables representing the remaining components of the communication model have significant values ranging from $.270$ to $.779$. If the significance values were greater than $p > .05$, it may be because of overlap with other independent variables. Overlap in this instance raises concerns of multicollinearity.

Table 6.3. Predictive Model for “Hearing” Messages^a Using Linear Multiple Regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig. ^b
	B	Std. Error	Beta		
1 (Constant)	.474	.115		4.141	.000 ***
Q14 Organization Awareness	.433	.135	.501	3.212	.002 **
Q12 Organization Trust	-.063	.135	-.070	-.469	.641

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig. ^b
	B	Std. Error	Beta		
Q11 Organization Reliance	-.148	.132	-.177	-1.114	.270
Q17 Confirm Messages with Other Teachers	-.019	.066	-.036	-.282	.779
Q6 Document Incorporation	.291	.108	.350	2.706	.009*

a. Dependent Variable: Document Familiarity

b. *.05 level of significance; **.01 level of significance; ***.001 level of significance

While the ability of multiple regression analyses to predict future outcomes would have made a significant contribution to this study, none of the iterations run produced results without significant overlap between the variables.

Defining a Model for “Hearing” and “Acting” – Logistic Regression

Logistic regression allows for the creation of models that predict categorical outcomes. This type of regression requires data preparation in the form of coding responses. Each of the variables used for the logistic regression iterations were binned into two large groups (1 to 5 and 6 to 10). Binning the data into dichotomous groups made analysis much more convenient. The importance of logistic regression was that it identified predictor variables and indicated the relative importance of such variables (Pallant 2010). In particular, the logistic regressions completed for this study aimed to determine whether or not model components 2 through 6 could be used to predict the outcomes for Model Component 1, “Hearing” as well as in determining whether or not model components 1 through 5 could be used to predict the outcomes for Model Component 6, “Acting.” The appeal of logistic regression is that through the evaluation of predictor variables a model may be defined from variable combinations that best

explain message “hearing” and teacher “acting.” The identification of the most pertinent predictor variables was paramount in this endeavor.

The first logistic regression run was completed using Model Component 1, “Hearing,” Question 1 (*teachers’ familiarity with documents/messages*) as the dependent variable. The covariates (predictors) were: Model 2 “Understanding” Question 14 (*organizations’ awareness of state standards*); Model 3 “Believing” Question 12 (*teachers’ trust in messages disseminated by organizations*); Model 4 “Perceiving” Question 11 (*teachers’ reliance on organizations*); Model 5 “Confirming” Question 17 (*teachers’ confirming with colleagues*); Model 6 “Acting” Question 6 (*teachers’ incorporation of messages into teaching*). The “Confirming” question had three categories regarding the frequency of discussion of messages with colleagues and friends. While the other covariates were dichotomous, Model 6 included positive (*confirms often*), neutral (*confirms sometimes*), and negative (*does not confirm*) categories.

Direct logistic regression was executed in SPSS to determine the impact of 5 factors on the likelihood that respondents would state they were *familiar with particular documents or messages* disseminated by academic and professional organizations in geographic education. The full model including all of the predictors listed above was statistically significant, with a χ^2 (6 degrees of freedom, N = 56) = 17.396, $p < .05$. This demonstrated that a distinction could be made between those respondents who were familiar with documents versus those respondents who were not familiar with documents. Overall, the model explained between 26.7% (Cox and Snell R-Square) and 43.9% (Nagelkerke R Square) of the variance in teachers’ *familiarity with documents/messages*. Additionally, it correctly classified 87.5% of cases. Table 6.4 reports only two variables

that made a unique statistically significant contribution to the model (*organizations' awareness of state standards and teachers' incorporation of messages into teaching*).

The Wald statistic, similar to the t-statistic in multiple regression, determined whether the B coefficient made a statistically significant contribution to the overall prediction. The results from the model confirmed that Questions 14 and 6 were making unique and statistically significant contributions since they were statistically significantly and different from zero. Of the two, *organizations' awareness of state standards* was the stronger predictor, with an odds ratio Exp(B) of 33.41. This indicated that respondents who believed *academic and professional organizations were aware of the state geography standards* were over 33 times more likely to be *familiar with documents disseminated by academic and professional organizations in geographic education*.

Table 6.4. Logistic Regression Predicting Likelihood that Teachers are Familiar with Documents/Messages

Variable	B	Std. Error	Wald	DF	p	Odds Ratio Exp(B)
Q14	3.51	1.54	5.18	1	0.02 *	33.41
Q12	-0.52	1.18	0.20	1	0.65	0.59
Q11	-1.50	1.41	1.13	1	0.29	0.22
Q17	N/A	N/A	0.26	2	0.88	N/A
Q17(1)	0.51	1.38	0.14	1	0.71	1.67
Q17(2)	0.65	1.29	0.26	1	0.61	1.92
Q6	2.38	0.99	5.71	1	0.02 *	10.81
Constant	-0.88	1.42	0.39	1	0.53	0.41

*.05 level of significance; **.01 level of significance; ***.001 level of significance

The second logistic regression run was completed using Model Component 6, “Acting,” Question 6 (*teachers' incorporation of messages into teaching*) as the dependent variable. The covariates (predictors) were: Model 1 “Hearing” Question 1 (*teachers' familiarity with documents/messages*); Model 2 “Understanding” Question 14

(*organizations' awareness of state standards*); Model 3 "Believing" Question 3 (*teachers' trust in documents*); Model 4 "Perceiving" Question 11 (*teachers' reliance on organizations*); Model 5 "Confirming" Question 17 (*teachers' confirming with colleagues*). The "Confirming" question had three categories regarding the frequency of discussion of messages with colleagues and friends.

Direct logistic regression was executed in SPSS to determine the impact of 5 factors on the likelihood that respondents would state they incorporated particular documents or messages disseminated by academic and professional organizations in geographic education into their teaching. The full model including all of the predictors listed above was statistically significant, with a χ^2 (6 degrees of freedom, N = 56) = 25.77, $p < .01$. This demonstrated that the model was able to determine those respondents who incorporated messages into their teaching versus those respondents who did not incorporate messages into their teaching. Overall, the model explained between 36.9% (Cox and Snell R Square) and 52.2% (Nagelkerke R Square) of the variance in document familiarity. Additionally, it correctly classified 80.4% of cases. Table 6.5 reports that only two variables made a unique statistically significant contribution to the model (*teachers' trust in documents/messages* and *teachers' reliance on organizations*). Of the two, *teachers' trust in documents/messages* was the stronger predictor, with an odds ratio Exp(B) of 16.02. This indicated that respondents who believed documents in geographic education are trustworthy were over 16 times more likely to incorporate documents disseminated by academic and professional organizations in geographic education into their teaching. These results were confirmed by the Wald statistic, as Question 3 (6.91) and Question 11 (5.73) have Wald statistic values that were statistically

significantly different from zero, indicating that they made a significant contribution to the prediction.

Table 6.5. Logistic Regression Predicting Likelihood of “Acting” as Defined by Incorporating Messages from Geographic Education Documents in Teaching

Variable	B	Std. Error	Wald	DF	<i>p</i>	Odds Ratio Exp(B)
Q1	1.62	1.00	2.60	1	0.11	5.05
Q14	-2.24	1.30	2.97	1	0.85	0.11
Q3	2.77	1.06	6.91	1	0.01 **	16.02
Q11	2.27	0.95	5.73	1	0.02 *	9.68
Q17	N/A	N/A	1.28	2	0.53	N/A
Q17(1)	-0.26	1.00	0.07	1	0.79	0.77
Q17(2)	0.94	1.31	0.52	1	0.47	2.57
Constant	-1.83	1.11	2.71	1	0.10	0.16

*.05 level of significance; **.01 level of significance; ***.001 level of significance

CHAPTER 7

QUALITATIVE ANALYSES FROM OPEN RESPONSES AND TEACHER INTERVIEWEES

Phase 3 called for a qualitative analysis of in-depth interviews with a sample of thirteen teachers who participated in the quantitative survey and who agreed to share more information about their experiences with top-down messages and message dissemination, whether they agreed to adopt new methods of instruction, or not, and challenges that related to receipt and implementation of messages.

Qualitative Results – Online Survey

The qualitative results began with the conclusion of the online survey. A number of questions afforded teachers the opportunity to provide additional explanation or explain their selection of the “Other” category. Question 1 addressed message familiarity and fourteen participants provided other academic or professional geographic education publications they were familiar with and are displayed in Table 7.1 below. Eight of the twelve responses included mention of the *Journal of Geography*, produced by NCGE. *The Geography Teacher* is also produced by NCGE. “Geography in the News” is a members’ only section of maps101.com; *Research in Geographic Education* is produced by the Grosvenor Center for Geographic Education; *Teaching Geography* is produced by the Geographical Association; *The Texan* is a publication of the Texas Council for the Social Studies.

Table 7.1. Familiarity with Other Geographic Education Publications

Answer	Responses
<i>Journal of Geography</i>	8
<i>The Geography Teacher</i>	3

Table 7.1-Continued	
Answer	Responses
EPISD Curriculum Guide	1
Geography in the News	1
<i>Research in Geographic Education</i>	1
<i>Teaching Geography</i>	1
<i>The Texan</i>	1

In addition to the opportunity to list other publications, if participants were not familiar with any of the documents listed, they could select that response and offer additional explanations. One teacher remarked, “I have heard of these. I have seen some of them. Some of them are cost prohibitive.” Similarly, one teacher stated there is “little or no communication from [the] Regional Service Center, no district funds for [publications].” These teachers were aware of the documents; however external barriers prevented further exploration of these documents. Another teacher responded, stating “[s]adly, Geography isn’t on the top on [school district] priority list, so there’s not a lot of support. Know that I’m aware, I’ll look them up.” This teacher indicated a willingness to become familiar with these documents; however, this teacher’s perception was that the school district did not make enough of an effort to accommodate such actions. Three teachers stated the only resource available to them was the textbook and two teachers commented on the outdated nature of the textbook.

Question 2 asked about the frequency of usage of documents. There were two qualitative responses for websites, one for a curriculum guide, seven for journals, two for textbooks, and seven for professional organizations. Of the 31 responses to this “Other” category, 17 indicated these documents were “not used at all.” This suggested that teachers were aware of a number of sources yet they did not use these sources at all.

Question 3 inquired about teachers’ trust of messages. The “Other” category included six

references to journals. Question 4, addressed the understandability of messages, and resulted in seven references to academic journals, five mentions of professional organizations, both state level and national level organizations, one mention of a textbook publisher, and one reference to a school district's curriculum guide. The responses indicated that teachers were rather ambivalent towards the sources they provided, with five responses indicating they were "extremely understandable" and four responses indicating they were "not understandable at all."

Question 5 addressed message application to state standards. In the "Other" category there were five journal references, five professional organization references (state and national levels), and one reference each for textbooks, school district curriculum guides, and the Texas Essential Knowledge and Skills (TEKS). One teacher commented that the textbook publisher was "so outdated they are not TEKS aligned anymore." The mean value for the "Other" category (5.07) suggested polarity among these user-submitted entries. Some were viewed as "extremely applicable to state standards" and others still were seen as "not at all applicable to state standards" as evidenced by the TEKS alignment quotation above.

Question 6, addressed teacher incorporation of messages, featured 9 entries in the "Other" category. Much like the previous questions, there were six journal references, five professional organization (state and national level) references, and one reference to a specific school district's curriculum guide. This question offered some insight into which messages are heard by teachers, as teachers do not incorporate messages without prior knowledge of said messages.

Question 7 asked teachers to rank the importance of sources for bringing to their attention publications concerning the teaching of geography. In the “Other” category, there were three references to professional organizations (state and national level), three references to journals (state and national level), a number of online resources, one reference to state and national geography conferences, and one reference to the Advanced Placement (AP) Reading in Human Geography. These last three references could be consolidated into the “From searching the Internet” and “Professional development activities” respectively. However, it was worthwhile to note that one teacher thought it important enough to isolate the importance of the AP Reading in Human Geography. This professional development event is a weeklong period where teachers from across the United States come together to grade the essay portions of the AP Human Geography test. The professional development that occurs at this event is unique as it brings together K-12 and collegiate teachers together with varied backgrounds, presenting opportunities for exchanges of ideas not typically seen at the local, state, or regional level. This confirmed, to a degree, the confirmation of messages through the act of further dissemination to colleagues.

Question 8 examined teachers’ familiarity with professional organizations in geographic education. The “Other” category revealed eight references to the Texas Alliance for Geographic Education (TAGE), two references to general state-level organizations, three references to local geography organizations, and a number of individual references to national and regional organizations that specialize in various aspects of geography. This question sought to understand how teachers go about learning what to teach in the classroom and one of the qualitative responses shed light onto the

difficulties teachers may have when accessing a multitude of professional organizations: “most teachers join their state Social Studies organization. I find that very few can afford both.” This is a telling quote that should not be ignored. In some cases of messages not reaching their intended audiences, the breakdown in communication may simply be an economic reason that is unrelated to the message characteristics.

Question 9 identified the memberships of survey participants. Twelve participants indicated they were members of TAGE. Two participants were members of the Texas Council for the Social Studies (TCSS) and four participants were members of local geography organizations. Three participants were members of national level organizations. These memberships offered insights into what teachers have heard, specifically, that teachers have heard from a variety of sources at a variety of scales, and from a variety of stakeholders of geographic education. As with Question 8, membership in multiple professional organizations may be cost prohibitive.

Question 10 asked teachers to share their opinions as to the effectiveness of professional organizations for disseminating messages. In the “Other” category, nine references were made to TAGE, three were made to other state level organizations, two were made to local organizations, and there were a number of national level organizations representing various aspects of geography. The mean value for these teacher submitted entries was 5.00, indicating ambivalence on the aggregate level, but polarity at the individual level as eight teachers indicated these sources to be “extremely effective” in dissemination while four teachers indicated their sources to be “not effective at all.”

Question 11 asked teachers to identify how much they relied upon professional organizations for obtaining messages about the teaching of K-12 geography. The

“Other” category, as with previous questions, featured ten references to TAGE, two references to TCSS, two references to local organizations as well as a number of national level organizations representing various aspects of geography. This question sought to understand how teachers go about learning what to teach in the classroom and these qualitative results suggested that teachers relied upon the least cost path as there were fifteen total references to local or state organizations.

Question 12 was an outgrowth of Question 11 as it sought to understand teachers’ trust in messages disseminated by professional organizations. In the “Other” category, there were twelve references to state level organizations, including nine TAGE references. Additionally, there were two references to local organizations and five references to national organizations. On the whole, the “Other” category had a mean value of 3.63 with eleven respondents indicating “extreme trust” in these organizations whereas only two respondents indicated “no trust at all.” This question revealed that of the various teacher-supplied sources, there was a great deal of trust among them. This also indicated that teachers had “heard” from a variety of sources.

Question 13, which examined how much teachers incorporated messages of any kind from professional organizations into their teaching, produced identical qualitative response to those from Question 12. In the “Other” category, there were twelve references to state level organizations, including nine TAGE references. Additionally, there were two references to local organizations and five references to national organizations. This question investigated the actions of teachers in regards to message incorporation and the “Other” category suggests the teacher-supplied sources are

incorporated more often than those provided in the question. This may indicate that teachers' actions are dictated by a variety of reasons, internal and external.

Question 14 asked teachers to comment on professional organizations' level of awareness concerning state standards. The "Other" category included nine TAGE references, two TCSS references, two local organization references, one general state organization reference, and one national level organization reference. These teacher-supplied responses had the best mean value (3.77), indicating organizations such as TAGE were acutely aware of Texas' standards.

Questions 15 and 16 asked teachers to indicate the importance of sources for developing courses prior to and since teaching geography. The "Other" category for both revealed teachers depended on their peers, indicating a degree of message confirmation as teachers discussed messages with colleagues. One qualitative response from Question 16 stood out: "formal training." The inclusion of formal training indicates teachers' backgrounds are varied, with little formal geographic education.

Question 19 gave teachers the opportunity to offer additional explanation of their degree of motivation to incorporate technology into the classroom. A number of themes emerged from these qualitative responses. Eleven teachers indicated they were actively using technology in the classroom. One teacher remarked that technology is a "powerful vehicle for engaging students at all levels in the study of geography, especially in showing the relative importance of geography in daily life." Eight teachers responded that they had limited access to technology. One teacher summed it succinctly: "I do not have the technology resources to incorporate it into my classroom." Six teachers stated the incorporation of technology was cost prohibitive. Specifically, one teacher stated "I

teach in an inner city school where over 80 percent of my students are on “Free Lunch” program. As such even though they own cell phones, a large percentage did not have computers at home and even when they do they may not have internet availability.” This quote speaks to technological disadvantages extending beyond the classroom. Two teachers indicated that they lacked the training to implement technology in the classroom and another two teachers were resistant to using technology in the classroom. One teacher believed that it’s, “use is limited in allowing students to “do” geography” and another teacher stated the use of technology slows down what can be covered. These sentiments reflect problems implementing technology in the classroom. For one teacher, the logistics of using technology cuts into actual teaching. For the other teacher, simply using technology did not enhance the teaching of geography.

Using NVivo software, word frequencies were generated for Question 19. The most commonly supplied words (and similar words) included “technology,” “geography,” “students,” “use,” and “access.” These words represented just over fifteen percent of the total words used for Question 19. The topic of technology was explored further in the qualitative phone interviews.

Question 21 asked teachers in which grades they currently teach geography, or have taught geography. The “Other” category revealed a number of different grade levels. Five indicated that they teach at the university level; two at fifth grade; two at seventh grade; five taught AP Human Geography at grades other than twelfth; three teachers at the K-6 level; one teacher was at the eighth grade level and one teacher was listed as a K-12 instructional coach. The variety of grades taught indicated a variety of

educational backgrounds among other receiver characteristics and may help to explain the variety of responses in regards to message awareness, trust, application, and so forth.

Question 22 asked teachers which geography course or courses they teach or have taught. Seven responded with pre-AP Human Geography; seven teach or have taught history courses; five indicated they teach college level courses. There was also a number of responses that indicated grade level or regions, but nothing else. The spectrum of courses taught may also help to explain the responses to message awareness, trust, and application.

Qualitative Results – Phone Interviews

The qualitative phone interviews were conducted after the online survey was closed. Thirteen teachers participated in the interviews – ten females and three males. Twelve of the teachers were currently teaching and one was a retired teacher. The interviews were structured, featuring ten questions with several follow-up questions to seven of the questions. These interviews were recorded with permission of the interviewees. Each interview was transcribed and then processed using NVivo software. Several themes emerged over the course of the coding process and are explained below. The analysis followed the sequence of the questions as they were asked during the course of each interview.

How do you hear or learn about information sources that assist you in the teaching of geography?

Five general sources emerged from Question 1. Professional organizations dominated the conversations as there were twenty references to specific organizations as well as general references to seeking out professional organizations. The word frequency

analysis yielded scattered results. This suggested that teachers are hearing and learning about sources in a variety of ways. One teacher remarked,

I belong to organizations that send out...news feeds that I can...find out more information and take it to another level...being a member of the AP (Advanced Placement) Human Geography Readers Group, where they're always sharing new things on our page and stuff like that, and also being in constant contact with what's happening the Texas Education Agency, TEA, those types of things, and the Texas Social Studies Supervisors Association, being a part of organizations is what has really helped me keep on top of what's happening.

Conversely, another teacher stated:

I teach sixth grade geography and there are not many sources first of all, that I hear about and I'm pretty isolated in a rural community in west Texas. [O]ur regional service center [doesn't] offer much. I'm a member of the Texas Alliance for Geographic [Education], and I sometimes, you know, get information from them, I subscribe to National Geographic Magazine, I get you know, just random emails sometimes on geography things, but I don't get much.

These responses indicated the wide range of responses in regards to the access to professional organizations. Five teachers mentioned TAGE, three mentioned NCGE, two mentioned National Geographic, two mentioned AAG.

The second theme that emerged in regards to Question 1 was the Internet. There were three general references to using the Internet, one reference to EdModo, and three references to social media – one general reference and two references to the use of Twitter. The third theme was professional development and there were three general references to it. The fourth and fifth themes each made one reference to academia and book reviews. One teacher indicated Texas State University was an important source for hearing or learning about sources. Another teacher stated book reviews were important sources. This teacher states:

[U]sually, believe it or not, it's through book reviews. I've looked at things like the New York Times, the L.A. Times, and I subscribe to Twitter feeds from different publishers, so as they launch books and books are reviewed, uh, that catches my

attention and then the next thought after "wow that's interesting" is how can I use this in the classroom to help geography to my students.

The variety of paths that teachers take in going about learning what to teach suggests they rely upon the least cost path of learning. The least cost path appears to be focused around what professional organizations have to offer, but for other teachers, they utilized the Internet, social media, professional development, academia, and book reviews to seek out new information.

Which sources have helped you the most? What are the main characteristics of these sources that appeal to you and encourage you to use them?

These questions sought to further understand how teachers go about learning what to teach in the classroom. The word frequency analysis was scattered. Not a single word or a group of words exceeded three percent. This may suggest the wide array of sources that are helpful to teachers. The first part of this question saw three main themes emerge. The first, reflecting the answers given for Question 1, is the role of professional organizations. There were twelve references to various professional organizations, at the state and national levels. The Internet emerged as the second theme with five references to it and various resources found online. The third theme was professional development. There were two references to workshops and institutes. The second part of this question saw a number of themes emerge. Six teachers referenced the convenience of sources; five addressed the content provided by sources; four discussed the opportunity for teacher interaction and networking; two talked about the importance of delivering updated materials; one stressed the practicality of the source; one teacher discussed the importance of the association with a trustworthy source. In regards to convenience, the Internet and social media have made it easier for teachers to digest large volumes of

information. In regards to social media, one teacher states “their initial synopsis, if you will, or like hooks, it's short enough to get you interested in, it's quick, and then if you want to find out more information, you keep going or you email them back or you call them or you tweet them or something, and if you don't, you don't, you move on.”

Another teacher, stressed the importance of practicality and stated “the stuff I like to use is the stuff that I think can fit very well within my, the structure of my class...theoretical stuff is nice but not really useful in day-to-day teaching, so the theoretical stuff doesn't help me too much. More practical, here, are some lesson plan ideas, here's a bunch of free materials you can use, stuff like that.” In regards to networking and teacher interaction after attending the 2012 NCGE conference in San Marcos, Texas, one teacher exclaimed, “I got a lot of information and met a lot of different people was able to network with a lot of people and [Texas State University] too really helps, helps me make geography better for the kids.” In addition to the importance of networking, this teacher also alluded to the importance of academia in providing trustworthy sources of geographic education.

Can you think of any documents or publications that you would never use? Why?

Overwhelmingly, teachers stated that they will look at anything. The most common responses indicated teachers that were in need of resources and would look at anything and that even if the sources were bad, teachers could use them as a means of instructing students on how to identify bias or poor sources. Two themes became clear while coding the responses to Question 3: the textbook was out-of-date and home-school websites were not to be trusted. In regards to the age of the textbook, one teacher stated:

My textbook is, like I said, its 17 years old. You know some of it is relevant, but not much. You show a map of...the Bosnia area from the book compared to what it really is, you know what I mean? You know, you can at least use it that way to show this is the way this book was 17 years ago, but this is the way it looks now and talk to them about why it changed and all things like that, I do a lot of stuff like that.

Despite the age of this teacher's textbook, the teacher found a way to turn it into a teaching tool. In this way, the textbook becomes little more than a reference tool; the teacher was using it as a historical atlas.

In regards to home-school websites, one teacher voiced her concerns about the lack of trustworthy sites on the Internet. “[I]n my searches I come across a site that an education site, has all of these beautiful resources and then you read further and it looks legit and then it's saying that it's very biased about what they're teaching, they're not good resources.” The need for teachers to scour the Internet for source materials suggests a communication breakdown between professional organizations that do have such materials and teachers, and conversely, a lack of awareness of teachers to understand that professional organizations do have materials for them. Once again, the word frequency analysis provided few commonalities between teachers, suggesting a wide range of responses.

On a scale from “1” to “10” where “1” means “not at all” and “10” means “extremely frequently,” describe the extent to which you use information sources beyond the traditional textbook for teaching geography? What does this number mean?

Table 7.2, shown below, reveals that these teachers used information sources beyond the traditional textbook extremely frequently. These self-reported values indicated that the textbook was not used very often by these teachers. During the coding process, four broad themes became clear: teachers use other sources a “majority of the

time” or “all of the time,” teachers are anti-textbook, teachers use a number of different sources, and one teacher acknowledged that this process is an investment of time. The word frequency analysis once again provided disparate results.

Table 7.2. Extent to Which Teachers Use Sources beyond the Textbook

Answer	Responses	Percentage
10	8	62%
9	2	15%
8	3	23%

On a scale from “1” to “10” where “1” means “not at all” and “10” means “extremely frequently,” give you opinion as to whether you think that teachers use information sources beyond the traditional textbook for teaching geography. What does this number mean?

The results from Question 4 became more interesting when compared to the results of Question 5. Question 5 asked teachers to comment on fellow teachers. Table 7.3, shown below, reveals mixed thoughts on such teachers. Some of the teachers interviewed provided multiple responses as they were discussing various teachers or groups of teachers.

Table 7.3. Extent to Which Other Teachers Use Sources beyond the Textbook

Answer	Responses	Percentage
10	4	22%
9	1	5%
8	2	11%
7	2	11%
6	2	11%
5	4	22%
4	1	5%
3	1	5%
0	1	5%

Some teachers referred to their coworkers with high esteem. One teacher described two teachers in his school, one he rates a 3 and the other a 10:

[T]he older teacher, you know, he wants to use his textbook and all that kind of stuff, so you know, both the other teacher and myself try to get him out of that, but he just goes right back into using that textbook, 'cause he's so damn old, but it's just not relevant...the lady a 10 because she does way more than I do...and you know these old guys that just stick to the textbook, worksheets and that's all it is.

This teacher highlighted age, a receiver characteristic, and this may contribute to the actions of teachers. Another teacher offered generalized thoughts on teachers. This teacher differed from the previous teacher as the analysis shows textbooks offered help for new teachers until they were able to establish themselves and familiarize themselves with training that is available:

I mean in my experience I think a lot of teachers, especially early on, I think you rely more on the textbook out of need, I think as your training gets better, you learn more, you work with other teachers and get good ideas, I think you drift away from it more, and start doing more interesting, what I would consider more interesting lessons and stuff that is more timely, because textbooks get out of date.

The quote above reveals that early in their careers, some teachers lack necessary content knowledge and rely upon the book. When asked to explain what these numbers meant to teachers, a few themes emerged. Five responded that fellow teachers were lazy, four stated teachers just want to use the textbook, and two discussed the fact that some teachers lacked necessary professional development and content knowledge. Three teachers remarked that teachers have to use the textbook; one teacher commented that some teachers do not have enough time to look for other sources; five teachers indicated that their fellow teachers go above and beyond all of the time to discover new sources of information. These quotes demonstrated how teachers go about learning, with some indications that teachers rely upon the least cost path, and that teachers confirm messages

through further dissemination to colleagues. The word frequency analysis yielded some interesting findings. “Textbook” and “teacher” were the most commonly used words. Additionally, many references were made to “time,” “use,” and “know” or variations of those words, and each of these address teachers’ backgrounds and actions regarding geography.

Do you use technology in the classroom for teaching geography? If yes, what types of technology do you use? If no, what prevents you from using technology for teaching geography?

Twelve teachers responded that they used technology in the classroom for teaching geography. One teacher indicated “yes and no” and she explained that over time she has increased her use of technology as it has become more readily available and accessible in the classroom. Teachers reported that they use different forms of hardware including Google Chromebooks, iPads, and two general references to hardware. Ten teachers mentioned the use of websites, in general; two mentioned YouTube specifically and there was one mention of Google Maps. Four teachers used Google Earth and two use EdModo. Three teachers stated that they used GIS in the classroom. One teacher addressed the importance of technology and the realities of using it in the classroom:

I mean we use basic technologies like we do lots of searching on the computer for data from various sources be it, government agency websites, things like the United Nations, the C.I.A. World Factbook, we use that kind of material, I'd be interested in using other kinds of technology, like GPS locators and things like that, I don't have the money to procure that stuff right now, but give it some time, I think I would do that, as far as individual applications and programs, that's more of a matter of what we have available at the school, and we don't have, we have some stuff, and we're getting some new stuff, but it's expensive and hard to come by.

This teacher recognized the importance of technology and tried to expose students to various technologies when possible. However, the reality remains for this teacher and

many others that procuring funds for new technology is often difficult. The word frequency analysis produced little other than the expectedly high frequency of “use” and similar words.

On a scale from “1” to “10” where “1” is “not valued at all” and “10” is “extremely valued,” how would you describe how social studies courses are seen within your school? What does this number mean?

Table 7.4, shown below, revealed that teachers believed that social studies courses were not valued very highly in their schools.

Table 7.4. Extent to Which Teachers Use Sources beyond the Textbook

Answer	Responses	Percentage
7	3	27%
5	5	45%
4	1	9%
3	2	18%

Five teachers believed that there was a central amount of value. The other six teachers did not give rankings far from the middle either. One teacher remarked that the “attitude is that social studies is easy and that's why they get such good of grades on state assessments and all that kind of stuff and you don't have to think with social studies, you have to remember facts, and it's not that way anymore.” Other teachers echoed this sentiment, stating “I think the district considers it least important, but definitely more important than the elective courses like foreign languages and P.E. and all of that.” Another teacher said social studies and geography were “[j]ust seen as an unnecessary item that makes people do maps.” One teacher, remained encouraged, “I would say we value it pretty highly, they're doing their best not to cut any of us, my school has taken the position that social studies is valuable, geography is valuable, and that we need to

keep teaching it.” The word frequency analysis revealed that teachers most often focused on the grade level and testing. Certain grade levels were tested which impacts how, according to teachers, schools viewed social studies and geography.

In your opinion, what is the best way for professional and academic organizations to reach you to assist you in your classroom teaching of geography?

The coding process produced a number of themes that teachers discussed for Question 8. Six teachers stated that email was the best way for professional and academic organizations to reach them. Despite this, one teacher commented that emails can often get overlooked and lost in the wake of so many emails being sent to teachers. Additionally, this same teacher described the same problem related to social media, stating:

I haven't been using Twitter lately, but I was subscribing to a few Twitter things and that was keeping me up, but I just I was subscribing to so many things, and my students weren't really using Twitter, so I was going to try to communicate with them and they get Twitter, Tweet them, Tweet me, I tweet to them, and that wasn't working out, so I kind of have put that off, but I hope to use that in the future.

Other teachers wished professional organizations would provide more opportunities for professional development, offer more webinars, offer more workshops, offer more mini institutes and conferences, provide stipends for travel to professional development, and to do a better job of advertising professional development opportunities.

The best way [professional organizations] could reach me and probably most of the teachers I know is to provide materials for us and I'm not just asking for free stuff...we need trainings run, we need stuff setup that we can access, we need stuff that we can use, I mean the theoretical, like thinking about how to educate people in geography is a great discussion to have at certain times of the year, day-to-day, if we want to strengthen geography education, which I think we need to do, you need to make it more accessible to a lot of teachers who don't have much of a background in geography like some of us do, so providing those materials, because a lot of teachers will learn interesting stuff via documentaries and things

like that, or materials they read, I think national organizations could provide a lot of that stuff as well, and they do somewhat.

This teacher offered an honest assessment of the teaching landscape and how professional organizations could best serve teachers. Content specific education and trainings are critical for this teacher. The word frequency analysis produced disparate results.

What do you need from academic and professional organizations for your teaching of geography?

Question 9 examined what teachers have heard and what they would like to hear from academic and professional organizations. Their prescriptions give some indication to their backgrounds in geography. A few themes emerged from the coding process of Question 9. Nine teachers referenced the need for more classroom resources and updated materials; four teachers discussed the need for more webinars, workshops, and institutes to improve geography content knowledge and pedagogy knowledge; three teachers stated the need for more online resources. One teacher remarked that it would be a nice incentive if there was college credit for attending professional development and one teacher simply said teachers need to be more proactive:

I think, honestly, I think it's doing what it needs to be doing, um, it's just people in our profession being more willing and taking advantage of opportunities, I mean, like I said I was one of those guys, I was just going to sit back and wait out my years, then I went to that national conference and it opened my eyes, that I needed to be more open to different stuff. The lady teacher I work with, she's younger and that's the way she is, so, you know, just listening to her, getting ideas from her has made a big difference for me too.

This teacher believed more of the onus to be on the teachers rather than the professional organizations. On the other hand, another teacher remarked, “[w]e need more in depth studies of hot spots in the world, we need more case studies from point of view, we need more justification of how do you explain to people who do not like geography or social

studies, that geography is necessary to be an educated person.” These remarks indicated the variety of viewpoints held by teachers. Once again, the word frequency analysis produced disparate results.

In the near future, say the next year, will you be looking for information beyond the traditional textbook for the teaching of geography in the classroom? If yes, in what ways? If no, why not?

Question 10 sought to understand how teachers go about learning what to teach in the classroom. The coding process revealed a number of themes. Eight teachers referenced using the Internet and online resources for finding new sources; three teachers relied on professional organizations; two utilized their teaching networks; one teacher sought out documentaries; one teacher traveled; three teachers remarked that they did not depend on the textbook at all. One teacher remarked “I may use textbook information as a starting point, but everything I do is outside of that.” Another teacher stated:

I'll look for anything that gets sent to me. I'll also be structuring and doing my own investigative research on the Internet if I know I'm covering a topic to try to keep my information up-to-date, I'll look for and if, given the opportunity, attend trainings that would hopefully have a lot to do with, maybe even just one aspect of geography that I could really incorporate into the classroom, that stuff's not always available, but often times it is, and I'll be looking for that kind of information at any professional conferences and things like that. Anything that I can find just kind of in the mass media, in, on the Internet, anywhere I can look.

The above response indicated the amount of drive that some teachers have compared to others. This teacher was seeking out resources in a number of different ways. One teacher responded “no” and this is because this particular teacher is leaving geography for a position in GIS and technology. The word frequency analysis yielded limited results.

Lastly, Figure 7.1, shown below, was produced in NVivo and demonstrated how each question asked in the phone interview was related to another, based on word similarity. Figure 7.1, seen below, indicates there were relationships between Question 6 and Question 10, Question 5 and Question 7, Question 1 and Question 2, Question 2 and Question 9, Question 3 and Question 6, and Question 4 and Question 5.

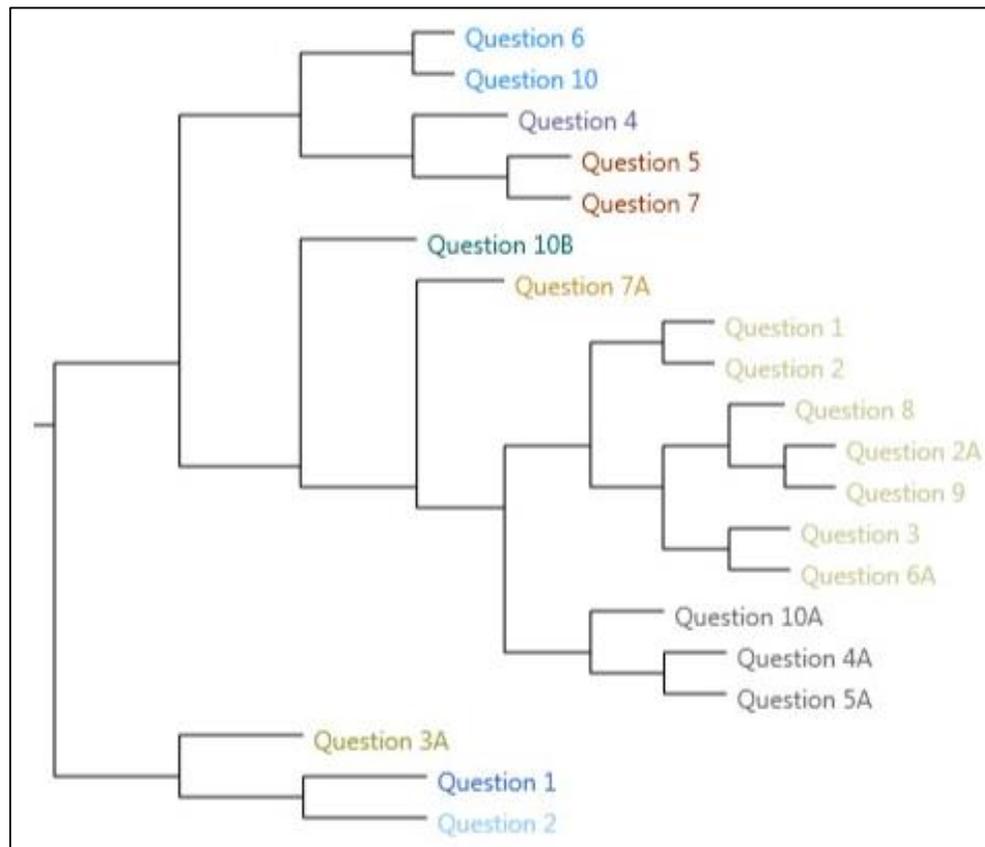


Figure 7.1. Nodes Clustered by Word Similarity

Summary of Analysis

This chapter examined a number of descriptive statistics related to the online survey as well as the qualitative responses given during the telephone interviews. The use of *Qualtrics*, NVivo, and SPSS made these analyses more manageable. Most of the

questions explored above make some mention of a link to a section of the Theorized Process of Communication Model. Each of these linkages will be explored in greater detail in the next chapter.

CHAPTER 8

CONCLUSION

Summary of Results

The first study question sought to understand the extent to which classroom teachers of geography “heard” or learned about the teaching of geography in the classroom from leaders in higher education and/or the community of professional geographers. The underlying hypothesis was that teachers “hear” messages or learn of new ways to teach geography but that the information emanates from diverse sources on a range of approaches and methods. The online survey results indicated that teachers have heard of some of these messages more so than others. Asked of their familiarity with documents, the response percentages ranged from 19 to 52. Teachers were most familiar with *Geography for Life – National Geography Standards, Second Edition*, *Geography for Life, Guidelines for Geographic Education*, and *Why Geography is Important*. It is fair to state message dissemination was not as effective as it might be. Additionally, 19 percent of teachers were not familiar with any documents. Nearly one fifth of teachers surveyed had not heard messages from leaders in geographic education.

The qualitative responses indicated that teachers seek information in a variety of ways. They attempt to hear messages by relying on professional organizations, the Internet, and professional development opportunities. The qualitative interviews revealed that teachers did not always hear messages delivered from leaders in geographic education. This suggested that teachers are seeking out new information but they are either seeking messages in the wrong places or professional organizations are not as

effective as they could be in disseminating these messages to the places teachers seek out new information.

The second study question sought to understand the degree to which classroom teachers of geography “understood” the information that they received or “heard” about – where the topics spanned a continuum from technology usage for developing map skills, spatial skills, and knowledge, to the use of more traditional tools, such as textbooks and hard copy static maps. The underlying hypothesis was that teachers “understood” the messages to an extent but, that other factors – internal and external – that is, receiver characteristics (teachers’ backgrounds, years of teaching, school resources, scheduling, testing, etc.) also played a vital role. Teachers tended to find documents disseminated by geographic education leaders to be understandable. In fact, most teachers reported that documents were “extremely understandable.” One might safely conclude that most teachers understand the messages they have heard from professional organizations. Thus, it appears that message characteristic of clearness or clarity is being met. However, understandability alone did not translate into use.

The third study question sought to understand the degree to which classroom teachers of geography “believed,” or trusted information that they received from leaders in geographic education, especially, the efficacy of its use. The underlying hypothesis was that teachers had different levels of beliefs, or trust, in messages received from geographic education leaders, due to their own personal attitudes and beliefs toward the teaching of geography in the classroom. The responses to Question 3 and Question 12 revealed that over 70 percent of participants trusted documents and messages in geographic education as well as the organizations that disseminated such documents and

messages. However, qualitative responses indicated the efficacy for classroom use was more important. Teachers believed the messages being disseminated; however, the primary preoccupation was with finding materials that were classroom ready.

The fourth study question sought to understand the degree to which classroom teachers, after hearing and believing disseminated information, “perceive” that they must change their approach to geography teaching. The underlying hypothesis was that teachers’ perceptions of their abilities to learn from professional development activities and apply that knowledge for technology in the classroom would be a factor in explaining how they preferred to teach geography. Qualitative responses provided insights as these interviewees were frank in stating that some teachers are industrious in seeking to improve themselves and their colleagues constantly; while, on the other end of the spectrum, the same interviewees remarked that some teachers were lazy and satisfied with teaching only from the textbook. These teachers ignored the newer messages being disseminated.

The fifth study question sought to understand whether teachers’ colleagues influenced their attitudes, beliefs, and perceptions of how to teach geography in the classroom (i.e., “confirmation”). The underlying hypothesis was that teachers discuss such messages, or confirm with colleagues, on methods, approaches, including technology, in their teaching of geography. The regression models indicated that a number of factors impact confirmation of messages. Overall, only 2 teachers responded that they did not ever discuss geographic education “messages” disseminated by national academic or professional organizations about the teaching of K-12 geography. Sixty-two teachers replied that they discussed such messages, even if those discussions were “not

very often.” In addition, teachers mentioned that they were shifting the way that they teach world geography. Qualitative responses indicated that teachers were shifting away from a regional approach and now focusing on a thematic approach. In this regard, it appeared as though teachers who attended professional development returned to their schools and confirmed this message with their colleagues. Seasoned teachers remarked that younger teachers were sharing their experiences and that those teachers were listening and willing to change their philosophies.

The sixth study question sought to understand the actual degree of acceptance of approaches and action to change ways to teach geography after “hearing” or learning new information disseminated from leaders in geographic education. The underlying hypothesis was that teachers may or may not act upon messages disseminated by influential leaders in geographic education; but if they do, there will be a range of responses to messages. Frequency of use, as reported by teachers in the online survey, was not tremendously high, however, incorporation of messages by teachers was slightly higher. Qualitative responses revealed that the sources that teachers used the most share characteristics. These characteristics included accessibility, convenience, practicality, and content. These responses indicated that teachers respected the overarching themes and messages disseminated by professional organizations. However, they found these long-term philosophical shift recommendations to be beyond their control or irrelevant to their day-to-day teaching. Teachers responded that the most appealing characteristics of sources of information were those that helped teachers on a day-to-day basis.

Fundamentally changing a teaching philosophy or accepting a paradigm shift was accepted on the surface; teachers recognized the value of those recommendations.

However, those recommendations did not reflect what was expected of them in the classroom and there did not appear to be statewide support for teachers to accept and implement such paradigm shifts.

Contribution to the Literature

The findings of this study demonstrated the paradigm shifting messages disseminated by professional organizations do resonate with teachers. Teachers understand these messages, yet are faced with school and classroom climates that prevent such shifts. These findings suggested that more emphasis should be placed on bottom-up changes rather than top-down changes. The trickledown effect reaches teachers, but at least at the statewide level for Texas, has not resulted in paradigm shifts. Additionally, it becomes apparent that resource allocation and distribution plays a large role in the implementation of technology-based paradigm shifts. In lieu of spending more money for the implementation of technology, teachers demonstrate creative ways to use the technology they do have access to and professional organizations could very well benefit from adopting this approach as part of their dissemination.

This research sheds light onto the communication process between leaders in geographic education and a key portion of their intended audience: teachers. A better understanding of this communication process helps identify and in the future may help to prevent further communication breakdowns. The teachers surveyed for this study demonstrated that there was awareness and trust of professional organizations, which establishes a baseline for continued communication. This provides opportunities for professional organizations to more effectively disseminate their messages, given they

adjust the message characteristics and the means of dissemination to reflect the locus of control for teachers and the ability of teachers to access such messages.

APPENDIX SECTION

A. IRB EXEMPTION127

B. QUALTRICS ONLINE SURVEY128

C. PHONE INTERVIEW SURVEY131

APPENDIX A: IRB EXEMPTION

Exemption Request EXP2013A610298P – Approval

AVPR IRB <ospirb@txstate.edu>

Fri, Nov 15, 2013 at 8:38 AM

To: mp1493@txstate.edu

DO NOT REPLY TO THIS MESSAGE. This email message is generated by the IRB online application program.

Based on the information in IRB Exemption Request EXP2013A610298P which you submitted on 11/14/13 14:01:42, your project is exempt from full or expedited review by the Texas State Institutional Review Board.

If you have questions, please submit an IRB Inquiry form:

http://www.txstate.edu/research/irb/irb_inquiry.html

Comments:

No comments.

=====

Institutional Review Board
Office of Research Compliance
Texas State University-San Marcos
(ph) 512/245-2314 / (fax) 512/245-3847 / ospirb@txstate.edu / JCK 489
601 University Drive, San Marcos, TX 78666

Texas State University-San Marcos is a member of the Texas State University System
NOTE: This email, including attachments, may include confidential and/or proprietary information and may be used only by the person or entity to which it is addressed. If the reader of this email is not the intended recipient or his or her agent, the reader is hereby notified that any dissemination, distribution or copying of this email is prohibited. If you have received this email in error, please notify the sender by replying to this message and deleting this email immediately. Unless otherwise indicated, all information included within this document and any documents attached should be considered working papers of this office, subject to the laws of the State of Texas.

APPENDIX B: QUALTRICS ONLINE SURVEY

1. Please select the geographic education publications that you are familiar with (Please check all that apply).
2. On a scale from 1 to 10, where 1 represents “very frequently used” and 10 represents “not used at all,” please indicate which publications you use the most for teaching of K-12 geography.
3. On a scale from 1 to 10, where 1 represents “extreme trust” and 10 represents “no trust at all” please indicate your trust in the “messages” from these publications for the teaching of K-12 geography.
4. On a scale from 1 to 10, where 1 represents “extremely understandable” and 10 represents “not understandable at all,” please indicate your opinion about the general level of easiness or difficulty in understanding “messages” from the following publications about the teaching of K-12 geography.
5. On a scale from 1 to 10, where 1 represents “extremely applicable to state geography standards,” and 10 represents “not at all applicable to state geography standards,” please indicate your opinion as to how applicable the “messages” from each publication are to your state geography standards in the teaching of K-12 geography.
6. On a scale from 1 to 10, where 1 represents “I always incorporate” and 10 represents “I never incorporate” please indicate the degree to which you incorporate “messages” of any kind from these geographic education publications in your geography teaching.
7. Please indicate the importance of each of the sources below for bringing to your attention any national geographic education publication that concerns K-12 teaching of geography (1=extremely important; 2=important; 3=not important at all; 4=not applicable).
8. Please select the academic or professional organizations in geographic education that you are familiar with (Please check all that apply).
9. If you are a member of one or more of these organizations, please indicate below.
10. On a scale from 1 to 10, where 1 represents “extremely effective” and 10 represents “not effective at all,” please indicate your opinion as to the effectiveness of each of these organizations for disseminating “messages” about the teaching of K-12 geography.
11. On a scale from 1 to 10, where 1 represents “highly relied on” and 10 represents “not relied on at all,” please indicate which academic and professional organizations you rely on the most for obtaining “messages” about the teaching of K-12 geography.

12. On a scale from 1 to 10, where 1 represents “extreme trust” and 10 represents “no trust at all” please indicate your trust in the “messages” from academic and professional organizations for the teaching of K-12 geography.
13. On a scale from 1 to 10, where 1 represents “I always incorporate” and 10 represents “I never incorporate” please indicate the degree to which you incorporate “messages” of any kind from these geographic education academic and professional organizations in your geography teaching.
14. On a scale from 1 to 10, where 1 represents “extremely aware of my state standards” and 10 represents “not at all aware of my state standards” in their “messages,” please indicate your opinion as to how aware these academic and professional organizations are of my state standards when they disseminate messages for the teaching of K-12 geography.
15. Prior to teaching your geography course(s), please indicate the importance of the following sources for developing your course(s). (1=extremely important; 2=important; 3=not important at all; 4=not applicable).
16. Now that you have experience teaching geography course(s), please indicate the importance of the following sources for teaching your course(s). (1=extremely important; 2=important; 3=not important at all; 4=not applicable).
17. In general, when you hear, or learn about any kind of geographic education “messages,” disseminated by national academic or professional organizations about the teaching of K-12 geography, do you discuss the information with your friends or colleagues? (1=always; 2=very often; 3=sometimes; 4=not very often; 5=not at all)
18. More recent “messages” from academic and professional organizations encourage teachers to incorporate technology in the classroom for teaching geography, where technology includes electronic “tools” beyond the Internet. On a scale from 1 to 10 where 1 represents “extremely motivated” and 10 represents “not at all motivated,” please indicate how motivated you are to incorporate technology beyond the Internet in your teaching of geography.
19. Please offer additional explanation to your response to the question above.
20. Approximately how many years have you been teaching geography? (Please enter a numeric value. For example, “6” rather than “six.”).
21. Please select the grades in which you teach geography course(s) (check all that apply).
22. What geography course(s) have you taught? (select all that apply).
23. How often do you attend geography-related professional development training? (1=never; 2=once every couple of years; 3=once a year; 4=more than once a year).
24. Please indicate your gender.
25. Please indicate your age range. (1= \leq 20; 2=21-30; 3=31-40; 4=41-50; 5= \geq 51).

26. Would you be willing to participate in an additional in-person interview to discuss your experiences and opinions of education communication messages regarding the teaching of K-12 geography disseminated in formal documents and/or by academic and professional organizations on the teaching of geography? (1=Yes; 2=No).
27. Please provide your e-mail address here in order to participate in an additional in-person interview to discuss your experiences and opinions of education communication messages regarding the teaching of K-12 geography disseminated in formal documents and/or by academic and professional organizations on the teaching of geography. Your e-mail address.

APPENDIX C: PHONE INTERVIEW SURVEY

1. How do you hear or learn about information sources that assist you in the teaching of geography?

2. Which sources have helped you the most?

What are the main characteristics of these sources that appeal to you and encourage you to use them?

3. Can you think of any documents or publications that you would never use?

Why?

4. On a scale from “1” to “10” where “1” means “not at all” and “10” means “extremely frequently”, describe the extent to which you use information sources beyond the traditional textbook for teaching geography?

What does this number mean? (Probe given their number)

5. On a scale from “1” to “10” where “1” means “not at all” and “10” means “extremely frequently”, give your opinion as to whether you think that teachers use information sources beyond the traditional textbook for teaching geography?

What does this number mean? (Probe, ask them to tell you what it means to them).

6. Do you use technology in the classroom for teaching geography?

If YES, What types of technology do you use?

If NO, What prevents you from using technology for teaching geography?

7. On a scale from “1” to “10” where “1” is “not valued at all”, and “10” is “extremely valued”, how would you describe how social studies courses are seen within your school?

What does this number mean? (Probe, ask them to tell you what it means to them).

8. In your opinion, what is the best way for professional and academic organizations to reach you to assist you in your classroom teaching of geography?

9. What do you need from academic and professional organizations for your teaching of geography?

10. In the near future, say the next year, will you be looking for information beyond the traditional textbook for the teaching of geography in the classroom?

YES, what ways?

NO, why not?

LITERATURE CITED

- Albert, W.S. and R.G. Golledge. 1999. The Use of Spatial Cognitive Abilities in Geographical Information Systems: The Map Overlay Operation. *Transactions in GIS*, 3(1): 7-21.
- American Geographical Society. "About the American Geographical Society." [amergeog.org](http://www.amergeog.org). <http://www.amergeog.org/organization.htm> (accessed October 11, 2013).
- Anderson, K.C. and G. Leinhardt. 2002. Maps as Representations: Expert Novice Comparison of Projection Understanding. *Cognition and Instruction*, 20(3), 283-321.
- Arnheim, R. 1976. The Perception of Maps. *The American Geographer*, 3(1), 5-10.
- Association of American Geographers. "About AAG." http://www.aag.org/cs/about_aag/about_geography_2/overview (accessed October 11, 2013).
- Baker, T.R. 2005. Internet-based GIS mapping in support of K-12 education. *The Professional Geographer*, 57(1), 44-50.
- Baker, T.R., A.M. Palmer, and J.J. Kerski. 2009. A National Survey to Examine Teacher Professional Development and Implementation of Desktop GIS, *Journal of Geography*, 108(4-5), 174-185.
- Bartz, B.S. 1970. Maps in the Classroom. *Journal of Geography*, 69(1), 18-24.
- Baylor, A.L. and D. Ritchie. 2002. What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? *Computers and Education*, 39(4), 395-414.
- Bednarz, R.S. 2002. The Quantity and Quality of Geography Education in the United States: The Last 20 Years. *International Research in Geographical and Environmental Education*, 11(2), 160-170.
- Bednarz, R.S. and J.F. Petersen (Eds.). 1994. *A Decade of Reform in Geographic Education: Inventory and Prospect*. Indiana, PA, USA: National Council for Geographic Education.
- Bednarz, S.W. 2004. US World Geography Textbooks: Their Role in Education Reform. *International Research in Geographical and Environmental Education*, 13(3), 223-238.

- Bednarz, S.W., R.M. Downs, and J.C. Vender, J.C. "Geography Education," in *Geography in America: At the dawn of the 21st century*, eds. G.L. Gaile and C.J. Willmott (New York, NY, USA: Oxford University Press, 2003), 461-478.
- Bednarz, S.W., S. Heffron., and N.T. Huynh. (Eds.). 2013. *A road map for 21st century geographic education: Geography education research* (A report from the Geography Education Research Committee of the Road Map for 21st Century Geography Education Project). Washington, DC, USA: Association of American Geographers.
- Bein, F.L. 1990. Baseline Geography Competency Test: Administered in Indiana Universities. *Journal of Geography*, 89(6), 260-265.
- Bein, F.L, J.J. Hayes, and T.G. Jones. 2009. Fifteen Year Follow-Up Geography Skills Test Administered in Indiana, 1987 and 2002. *Journal of Geography*, 108(1), 30-36.
- Berlyne, D.E. 1970. Novelty, complexity, and hedonic value. *Perception and Psychophysics*, 8(5), 279-286.
- Bodzin, A. 2011. The implementation of a geospatial information technology (GIT)-supported land use change curriculum with urban middle school learners to promote spatial thinking. *Journal of Research in Science Teaching*, 48(3), 281–300.
- Boehm, R.G. The First Assessment: A Contextual Statement, in *The First Assessment: Research in Geographic Education*, eds. R.G. Boehm and J.F. Petersen (San Marcos, Texas, USA: The Gilbert M. Grosvenor Center for Geographic Education, 1997), 1-16.
- Boehm, R.G., J. Brierley, and M. Sharma. 1994. The Bête Noir of Geographic Education: Teaching Training Programs. *Journal of Geography*, 93(1), 21-25.
- Boehm, R.G. and J.F. Petersen. (Eds.). 1997. *The First Assessment: Research in Geographic Education*. San Marcos, TX, USA: The Gilbert M. Grosvenor Center for Geographic Education.
- Bowman, E., R. Kilian-Smith, and S. Brown. 2005. Developing teacher capacity to implement GIS in the geography curriculum. *Proceedings of the 2005 ESRI Education User Conference*, July 23-26, 2005, San Diego, CA, USA.
- Briscoe, C. 1991. The dynamic interactions among beliefs, role metaphors and teaching practices: A case study of teacher change. *Science Education*, 75 (5), 185–199.

- Burt, J.E., G.M. Baker, and D.L. Rigby. 2009. *Elementary Statistics for Geographers*. New York, NY, USA: Guilford Press.
- Caldwell, S. 2010. *Statistics Unplugged*. Belmont, CA, USA: Wadsworth Publishing.
- Chaiken, S. and A.H. Eagly. 1976. Communication modality as a determinant of message persuasiveness and message comprehensibility. *Journal of Personality and Social Psychology*, 34(4), 605-614.
- Clarke, D. 2003. Are You Functionally Map Literate? *Proceedings of the 21st International Cartographic Conference (ICC)*, Durban, South Africa, August 10-16, 2003.
- College Board. "School AP Score Distributions By Total And Ethnic Group." collegeboard.com, http://www.collegeboard.com/student/testing/ap/exgrd_sum/2012.html (accessed November 18, 2012).
- Creswell, J.W. 2009. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, CA, USA: Sage Publications.
- Cuban, L., H. Kirkpatrick, and C. Peck. 2001. High Access and Low Use of Technologies in High School Classrooms: Explaining an Apparent Paradox, *American Educational Research Journal*, 38(4), 813-834.
- Donaldson, D. 2000. Public high schools' ability to support GIS: An Ohio case study. *Geographical Bulletin*, 41(2), 91-102.
- Edelson, D.C., R.J. Shavelson, and J.A. Wertheim. (Eds.). 2013. A roadmap for 21st century geographic education: Assessment (A report from the Geography Education Research Committee of the Road Map for 21st Century Geography Education Project). Washington, DC, USA: National Geographic Society.
- Downs, R.M. 1994. The Need for Research in Geography Education: It would be nice to have some data. *Journal of Geography*, 93(1), 57-60.
- Elbow, G.S., D.J. Rutherford, and C. Shearer. (Eds.). 2011. *Geographic Literacy in the United States: Challenges and Opportunities in the NCLB Era*. Washington DC, USA: National Council for Geographic Education.
- Ely, D. 1999. Toward a philosophy of instructional technology: Thirty years on. *British Journal of Educational Technology*, 30(4), 305-310.

- Ertmer, P.A., S. Gopalakrishnan, and E. Ross. 2000. Technology-Using Teachers: Comparing perceptions of exemplary technology use to best practice. Paper presented at the Annual Meeting of the American Educational Research Association. New Orleans, LA, USA, April 2000.
- Ertmer, P.A. and A.T. Ottenbreit-Leftwich. 2010. Teacher Technology Change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255-284.
- Eteokleous, N. 2008. Evaluating computer technology integration in a centralized school system, *Computers and Education*, 51(2), 669-686.
- Festinger, L. 1950. Informal social communication. *Psychological Review*, 57(5), 271-282.
- Field, A. 2009. *Discovering Statistics Using SPSS*. London, UK: Sage Publications.
- Forrest, D. 2003. Cartographic Education and Research in the UK. *The Cartographic Journal*, 40(2), 141-146.
- Galak, J., J. Kruger, and G. Loewenstein. 2011. Is variety the spice of life? It all depends on the rate of consumption. *Judgment and Decision Making*, 6(3), 230-238.
- Gauvain, M. 1993. The Development of Spatial Thinking in Everyday Activity. *Developmental Review*, 13(1), 92-121.
- Geography Education Standards Project. 1994. *Geography for life: National geography standards 1994*. Washington, DC, USA: National Geographic Research and Exploration.
- Gerard, L.F., K. Varma, S.B. Corliss, and M.C. Linn. 2011. Professional Development for Technology-Enhanced Inquiry Science, *Review of Educational Research*, 81(3), 408-448.
- Gilbert M. Grosvenor Center for Geographic Education. "About Us." [geo.txstate.edu, http://www.geo.txstate.edu/grosvenor/About-Us/GCGE.html](http://www.geo.txstate.edu/grosvenor/About-Us/GCGE.html) (accessed October 11, 2013).
- Gilbert M. Grosvenor Center for Geographic Education. 2012. *Why Geography is Important*. San Marcos, TX, USA: Gilbert M. Grosvenor Center for Geographic Education.
- Goode, J.P. 1927. The Map as a Record of Progress in Geography. *Annals of the Association of American Geographers*, 17(1), 1-14.

- Goodman, L.A. 1961. Snowball Sampling. *The Annals of Mathematical Statistics*, 32(1), 148-170.
- Gray, L. "Map reading skills 'dying out due to internet and satnavs.'" telegraph.co.uk, <http://www.telegraph.co.uk/news/2639307/Map-reading-skills-dying-out-due-to-internet-and-satnavs.html> (accessed November 18, 2012).
- Greenwald, A.G. "Cognitive Learning, Cognitive Response to Persuasion, and Attitude Change," in *Psychological Foundations of Attitudes*, eds. A.G. Greenwald, T.C. Brock, and T.M. Ostrom (New York, NY, USA: Academic Press Inc., 1968). 147-170.
- Grosvenor, G.M. 1995. In Sight of the Tunnel: The Renaissance of Geography Education. *Annals of the Association of American Geographers*, 85(3), 409-420.
- Hadley, M. and K. Sheingold. 1993. Commonalities and Distinctive Patterns in Teachers' Integration of Computers. *American Journal of Education*, 101(3), 261-315.
- Hauselt, P. and J. Helzer. 2012. Integration of Geospatial Science in Teacher Education. *Journal of Geography*, 111(5), 163-172.
- Hawkins, M.L. 1977. Map and globe skills in elementary school textbooks. *Journal of Geography*, 76(7), 261-265.
- Heffron, S.G. and R.M. Downs (Eds.), 2012. *Geography for life: National geography standards (2nd ed.)*. Washington, DC, USA: National Council for Geographic Education.
- Hill, A.D. 1981. A Survey of the Global Understanding of American College Students: A Report to Geographers. *The Professional Geographer*, 33(2), 237-245.
- Hill, A.D. 1995. "Geography instructional materials for standards-based education," in *A decade of reform in geographic education: Inventory and prospect*, eds. R.S. Bednarz and J.F. Petersen (Indiana, PA, USA: National Council for Geographic Education, 1995), 37-47.
- Hovland, C.I., I.L. Janis, and H.H. Kelley. 1953. *Communication and Persuasion*. New Haven, CT, USA: Yale University Press.
- Hovland, C.I and W. Weiss. 1951. The Influence of Source Credibility on Communication Effectiveness, *Public Opinion Quarterly*, 15(4), 635-650.
- Inan, F. and D.L. Lowther. 2010. Factors affecting technology integration in K-12 classrooms: A path model, *Educational Technology Research and Development*, 58(2), 137-154.

- Ishikawa, T., H. Fujiwara, O. Imai, and A. Okabe. 2008. Wayfinding with a GPS-based mobile navigation system: A comparison with maps and direct experience. *Journal of Environmental Psychology*, 28(1), 74-82.
- Joint Committee on Geographic Education. 1984. *Guidelines for Geographic Education: Elementary and Secondary Schools*. Washington, DC, USA and Macomb, IL, USA: Association of American Geographers and National Council for Geographic Education.
- Kerski, J.J. 2003. The implementation and effectiveness of geographic information systems technology and methods in secondary education. *Journal of Geography*, 102(3), 128–137.
- Kerski, J.J. and D.C. Edelson. “Foreword,” in *Geography Literacy in the United States: Challenges and Opportunities in the NCLB Era*, eds. G.S. Elbow, D.J. Rutherford, and C. Shearer (Washington, DC, USA: National Council for Geographic Education, 2011), iii-iv.
- Kozak, S.L., J.E. Dobson, J.S. Wood, W.R. Wells, and D. Haynes. 2013. The American Geographical Society’s Geographic Knowledge and Values Survey: Report of results for the United States. Special Publication #43. Brooklyn, NY, USA: American Geographical Society.
- Kulo, V.A. and A.M. Bodzin. 2011. Integrating geospatial technologies in an energy unit. *Journal of Geography*, 110(6), 239–251.
- Larson, C.U. 1992. *Persuasion: Reception and Responsibility*. Belmont, CA, USA: Wadsworth Publishing Company.
- Lee, J. and R. Bednarz. 2009. Effect of GIS learning on spatial thinking. *Journal of Geography in Higher Education*, 33(2), 183–198.
- Levin, T. and R. Wadmany. 2008. Teachers’ views on factors affecting effective integration of information technology in the classroom: Developmental scenery, *Journal of Technology and Teacher Education*, 16(2), 233-263.
- Liu, Y., E.N. Bui, C.H. Chang, and H.G. Lossman. 2010. PBL-GIS in secondary geography education: Does it result in higher-order learning outcomes? *Journal of Geography*, 109(4), 150–158.
- MacEachren, A.M. 1995. *How Maps Work*. New York, NY, USA: The Guilford Press.
- Marcinkiewicz, H.R. 1995. Differences in Computer Use of Practicing versus Preservice Teachers. *Journal of Research on Computing in Education*, 27(2), 184-198.

- McClave, J.T., and P.G. Benson. 1982. *Statistics for Business and Economics, 2nd Ed.* San Francisco and Santa Clara, CA, USA: Dellen, Publishing Company.
- McGuire, W.J. "An information-processing model of advertising effectiveness," in *Behavioral and management sciences in marketing*, eds. H.L. Davis and A.J. Silk. (New York, NY, USA: Wiley, 1978), 156-180.
- Mileti, D.S. and J.H. Sorensen, J.H. 1990. "Communication of Emergency Public Warnings: A Social Science Perspective and State-of-the-Art Assessment." Prepared for the Federal Emergency Management Agency. Washington, DC, USA: U.S. Department of Energy.
- Muir, S.P. 1985. Understanding and Improving Students' Map Reading Skills. *The Elementary School Journal*, 86(2), 206-216.
- Münzer, S., H.D. Zimmer, M. Schwalm, J. Baus, and I. Aslan. 2006. Computer-assisted navigation and the acquisition of route and survey knowledge. *Journal of Environmental Psychology*, 26(4), 300-308.
- National Assessment Governing Board. 1992. *Geography Framework for the 1994 National Assessment of Educational Progress*. Washington, DC, USA: National Assessment Governing Board.
- National Center for Education Statistics. 2011. *The nation's report card: Geography 2010*. Washington, DC, USA: Institute of Education Sciences, U.S. Department of Education.
- National Council for Geographic Education. "About Us." ncge.org, <http://ncge.org/about> (accessed October 11, 2013).
- National Geographic Society. "About Us." [nationalgeographic.com](http://www.nationalgeographic.com), <http://www.nationalgeographic.com/about/> (accessed October 11, 2013).
- National Geographic Society. "2006 National Geographic-Roper Survey of Geographic Literacy," [nationalgeographic.com](http://www.nationalgeographic.com), <http://www.nationalgeographic.com/roper2006/findings.html> (accessed October 11, 2013).
- National Geographic Network of Alliances for Geographic Education. "Our Mission." alliances.nationalgeographic.com, <http://alliances.nationalgeographic.com/about/our-mission/edn8FD8788B6B4D3185C> (accessed October 11, 2013).
- National Research Council. 2006. *Learning to think spatially: GIS as a support system in the K-12 curriculum*. Washington, DC, USA: National Academies Press.

- Natoli, S. J. 1988. "Preface," in *Strengthening Geography In The Social Studies Bulletin No. 81*, ed. S. J. Natoli (Washington, DC, USA: National Council for the Social Studies, 1988), ix-x.
- Natoli, S.J. 1994. "Guidelines for Geographic Education" and the Fundamental Themes in Geography. *Journal of Geography*, 93(1), 2-6.
- Natoli, S.J. (Ed). 1984. *Guidelines for Geographic Education: Elementary and Secondary Schools*. Washington, DC, USA: Joint Committee on Geographic Education of the National Council for Geographic Education and the Association of American Geographers.
- Nellis, M.D. 1994. Technology in Geographic Education: Reflections and Future Directions. *Journal of Geography*, 93(1), 36-39.
- Pallant, J. 2010. *SPSS Survival Manual*. Maidenhead, Berkshire, England: Open University Press.
- Patterson, T.C. 2007. Google Earth as a (Not Just) Geography Education Tool. *Journal of Geography*, 106(4), 145-152.
- Pattison, W.D. 1966. Territory, Learner, and Map. *The Elementary School Journal*, 67(3), 146-153.
- Patton, M.Q. 2002. *Qualitative Research and Evaluation Methods*. Thousand Oaks, CA, USA: Sage Publications.
- Pearson, G. and A.T. Young, (Eds.). 2002. *Technically Speaking: Why all Americans need to know more about technology*. Washington, DC, USA: National Research Council.
- Petchenik, B.B. 1985. Value and values in cartography. *Cartographica: The International Journal for Geographic Information and Geovisualization*, 22(3), 1-59.
- Petty, R.C. and P. Briñol. "Attitude structure and change: Implications for implicit measures," in *Handbook of Implicit Social Cognition: Measurement, theory, and applications*, eds. B. Gawronski and B.K. Payne (New York, NY, USA: Guilford, 2010), 335-352.
- Petty, R.C. and J.T. Cacioppo. 1979. Issue Involvement Can Increase or Decrease Persuasion by Enhancing Message-Relevant Cognitive Responses. *Journal of Personality and Social Psychology*, 37(10), 1915-1926.
- Petty, R.C. and J.T. Cacioppo. 1986. The Elaborating Likelihood Model of Persuasion. *Advanced Experimental Social Psychology*, 19, 123-205.

- Pornpitakpan, C. 2004. The Persuasiveness of Source Credibility: A critical review of five decades' evidence. *Journal of Applied Social Psychology*, 34(2), 243-251.
- President's Commission on Foreign Language and International Studies. 1979. *Strength through Wisdom, A Critique of U.S. Capability: A report to the President from the President's Commission on Foreign Language and International Studies*. Washington, DC, USA: U.S. Department of Health, Education, and Welfare, Office of Education.
- Rediscovering Geography Committee. 1997. *Rediscovering Geography: New relevance for science and society*. Washington, DC, USA: National Academy Press.
- Reinfried, S. 2006. Conceptual change in physical geography and environmental sciences through mental model building: The example of groundwater. *International Research in Geographical and Environmental Education*, 15(1), 41-61.
- Resler, L.M. and K.M. Kolivras. 2009. A field-based technique for teaching about habitat fragmentation and edge effects. *Journal of Geography*, 108(4-5), 210-218.
- Renner, G.T. 1944. What the war has taught us about geography. *Journal of Geography*, 43(9), 321-330.
- Russell, M., D. Bebell, L. O'Dwyer, and K. O'Connor. 2003. Examining teacher technology use: Implications for preservice and inservice teacher preparation, *Journal of Teacher Education*, 54(4), 297-310.
- Rutherford, D.J. and W.J. Lloyd. 2001. Assessing a computer-aided instructional strategy in a world geography course. *Journal of Geography in Higher Education*, 25(3), 341-355.
- Salter, C.L. 1986. Geography and California's Educational Reform: One approach to a common cause. *Annals of the Association of American Geographers*, 76(1), 5-17.
- Salter, C.L. 1987. The Nature and Potential of a Geographic Alliance. *Journal of Geography*, 86(5), 211-215.
- Sauer, C. 1956. The education of a geographer. *Annals of the Association of American Geographers*, 46(3), 287-299.
- Schell, E.M., K.J. Roth, and A. Mohan, (Eds.). 2013. A road map for 21st century geography education: Instructional methods and professional development (A report from the Instructional Materials and Professional Development Committee of the Road Map for 21st Century Geography Education Project). Washington, DC, USA: National Council for Geographic Education.

- Schultz, R.B., J.J. Kerski, and T.C. Patterson. 2008. The Use of Virtual Globes as a Spatial Teaching Tool with Suggestions for Metadata Standards. *Journal of Geography*, 107(1), 27-34.
- Segall, A. and R.J. Helfenbein, "Research on K-12 geography education," in *Handbook of research in social studies education*, eds. L.S. Levstik and C.A. Tyson (New York, NY, USA: Routledge, 2008). 259-283.
- Sheldon, K.M. and S. Lyubomirsky. 2012. The Challenge of Staying Happier: Testing the hedonic adaptation prevention model. *Personality and Social Psychology Bulletin*, 38(5), 670-680.
- Shin, E-k. 2007. Using Geographic Information System (GIS) technology to enhance elementary students' geographic understanding. *Theory and Research in Social Education*, 35(2), 231-255.
- Sinton, D.S. and J.J. Lund. 2007. *Understanding place: GIS and mapping across the curriculum*. Redlands, CA: Esri Press.
- Smith, M.J. 1982. *Persuasion and Human Action: A Review and Critique of Social Influence*. Belmont, CA, USA: Wadsworth Publishing Company.
- Songer, L.C. 2010. Using web-based GIS in introductory human geography. *Journal of Geography in Higher Education*, 34(3), 401-417.
- Speake, J. and S. Axon. 2012. "I Never Use 'Maps' Anymore": Engaging with sat nav technologies and the implications for cartographic literacy and spatial awareness. *The Cartographic Journal*, 49(4), 326-336.
- Stang, D.J. 1975. Effects of 'mere exposure' on learning and affect. *Journal of Personality and Social Psychology*, 31(1), 7-12.
- Texas Education Agency. "EOC Statewide Raw Score Distribution Reports." [tea.state.tx.us](http://www.tea.state.tx.us), http://www.tea.state.tx.us/index3.aspx?id=5155&menu_id=793 (accessed August 21, 2013).
- Theo, L. 2011. Simplifying central place theory using GIS and GPS. *Journal of Geography*, 110(1), 16-26.
- Trivedi, B.P. "Survey Reveals Geographic Illiteracy." [nationalgeographic.com, http://news.nationalgeographic.com/news/2002/11/1120_021120_GeoRoperSurvey.html](http://news.nationalgeographic.com/news/2002/11/1120_021120_GeoRoperSurvey.html) (accessed November 18, 2012).

- Turner, R.H., J.M. Nigg, D.H. Paz, and B.S. Young. 1981. "Community Response to Earthquake Threat in Southern California, Part 10, Summary and Recommendations." Los Angeles, CA, USA: Institute for Social Science Research, University of California, Los Angeles.
- Valverde, G.A. and W.H. Schmidt. 1997. Refocusing U.S. math and science education. *Issues in Science and Technology*, 14(2), 60–66.
- Vannatta, R.A. and N. Fordham. 2004. Teacher Dispositions as Predictors of Classroom Technology Use. *Journal of Research on Technology in Education*, 36(3), 253-271.
- Warner, M. 2002. Publics and Counterpublics. *Public Culture*, 14(1), 49-90.
- Weiss, A.R., A.D. Lutkus, B.S. Hildebrant, and M.S. Johnson. 2002. *The Nation's Report Card: Geography 2001*. Washington, DC, USA: National Center for Education Statistics.
- Wigglesworth, J. C. 2003. What is the best route? Route-finding strategies of middle school students using GIS. *Journal of Geography*, 102(6), 282–291.