

1-1-2004

The effect of specificity of relevance instructions on reading time and learning

Matthew Thomas McCrudden
University of Nevada, Las Vegas

Follow this and additional works at: <https://digitalscholarship.unlv.edu/rtds>

Repository Citation

McCrudden, Matthew Thomas, "The effect of specificity of relevance instructions on reading time and learning" (2004). *UNLV Retrospective Theses & Dissertations*. 2610.
<http://dx.doi.org/10.25669/obky-2l81>

This Dissertation is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Dissertation in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Dissertation has been accepted for inclusion in UNLV Retrospective Theses & Dissertations by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

THE EFFECT OF SPECIFICITY OF RELEVANCE INSTRUCTIONS
ON READING TIME AND LEARNING

by

Matthew Thomas McCrudden

Bachelor of Science in Business Administration
University of Nebraska, Lincoln
1998

Master of Arts
University of Nebraska, Lincoln
2001

A dissertation submitted in partial fulfillment
of the requirements for the degree of

Doctor of Philosophy in Learning and Technology
Department of Educational Psychology
College of Education

Graduate College
University of Nevada, Las Vegas
May 2005

UMI Number: 3186465

INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

UMI[®]

UMI Microform 3186465

Copyright 2006 by ProQuest Information and Learning Company.

All rights reserved. This microform edition is protected against unauthorized copying under Title 17, United States Code.

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346



Dissertation Approval

The Graduate College
University of Nevada, Las Vegas

____ January 21 _____, 20 05

The Dissertation prepared by

____ Matthew Thomas McCrudden _____

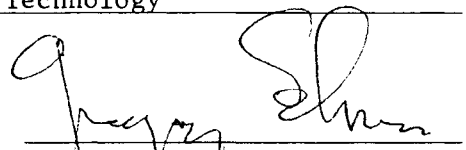
Entitled

____ The Effect of Specificity of Relevance Instructions on _____


____ Reading Time and Learning _____

is approved in partial fulfillment of the requirements for the degree of

____ Doctor of Philosophy in Learning and Technology _____



Examination Committee Chair



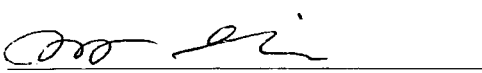
Dean of the Graduate College



Examination Committee Member



Examination Committee Member



Graduate College Faculty Representative

ABSTRACT

The Effect of Specificity of Relevance Instructions on Reading Time and Learning

by

Matthew Thomas McCrudden

Dr. Gregory Schraw, Examination Committee Chair
Professor of Educational Psychology
University of Nevada, Las Vegas

The purpose of this study was to examine whether the specificity of relevance instructions affects reading time and learning. Sixty-three undergraduates read a passage that described the attributes of two fictitious countries. Before reading, participants read pre-reading questions (specific), were given the goal of deciding whether one of the countries would be a good place to live (general), or to read for understanding (control). The specificity of relevance instructions did not affect reading time or recall. Those receiving relevance instructions tended to recall more than those in the control group, although the differences were not statistically significant. Results are discussed and directions for future research are proposed.

TABLE OF CONTENTS

ABSTRACT.....	iii
LIST OF TABLES.....	vi
ACKNOWLEDGMENTS	vii
CHAPTER 1 INTRODUCTION	1
Previous Research on Relevance Instruction.....	3
Purpose of the Present Study	11
CHAPTER 2 LITERATURE REVIEW	13
Relevance.....	13
Relevance Effect	14
Taxonomy of Relevance	14
Specific Relevance Instructions.....	16
Specific: Targeted Segments.....	17
Specific: Elaborative Interrogation	23
General Relevance Instructions	28
General: Perspective	28
General: Purpose.....	32
Summary of Relevance Research Findings	37
Main Conclusions	39
The Present Study	41
Hypotheses.....	43
Predictions.....	45
Outcome Measures.....	47
Summary of the Present Study.....	48
CHAPTER 3 METHODOLOGY	49
Participants and Design.....	49
Materials	50
Procedure	51
Reading Time.....	53
Scoring of Recall.....	53
Scoring of Compare and Contrast Essay	54
Scoring of Short-Answer Item	55
CHAPTER 4 RESULTS	56

Reading Time.....	56
Recall	60
Compare and Contrast Essay	64
Choice Item	65
Interest.....	66
Correlations.....	66
Summary of Findings.....	67
 CHAPTER 5 DISCUSSION.....	 69
Review of Results	71
Reading Time.....	72
Recall	73
Essay	75
Interest.....	75
Explanation of Results	75
Limitations of the Present Study.....	77
Future Directions	78
Main Contribution of the Dissertation	79
 APPENDICES	
Appendix A: Control Instructions.....	80
Appendix B: Specific Relevance Instructions	81
Appendix C: General Relevance Instructions.....	82
Appendix D: Morinthia & Culatta: Geography, Commerce, and People	83
Appendix E: Interest Questionnaire.....	87
Appendix F: Recall Instructions	88
Appendix G: Compare/Contrast Essay	89
Appendix H: Choice Item	90
Appendix I: Informed Consent Form.....	91
Appendix J: Institutional Review Board Protocol	93
 REFERENCES	 95
 VITA.....	 100

LIST OF TABLES

Table 1 Reading Time Proportion Means and Standard Deviations by Condition.....	57
Table 2 Recall Proportion Means and Standard Deviations by Condition	61
Table 3 Category Access Means and Standard Deviations by Condition	63
Table 4 Essay Claims & Essay Quality Means and Standard Deviations by Condition ..	65
Table 5 Correlations among Dependent Variables	68

ACKNOWLEDGMENTS

I would like to thank my parents, Tom and Jan, and my sister Maureen for their unwavering support and guidance. My accomplishments must be viewed in light of the foundation provided by my immediate and extended family; those who are with us and those who are waiting for us to join the party on the other side.

I would also like to thank my committee members Alice Corkill, Ralph Reynolds, and Jeff Shih for their willingness to guide me through this process. I would like to extend a special thanks to my advisor, Gregg Schraw. Gregg and I met on a regular basis, often for several hours at a time as I conceptualized and wrote this project. I sincerely appreciate how Gregg has been personally invested in challenging me to reach my current potential.

I have received support from countless friends and colleagues throughout graduate school and am grateful for their contributions to my professional and personal growth. Your support has fueled my success.

To all of you, an Irish toast: 'Tis glad I am and glad I'll be, that you like knowin' the likes of me!

CHAPTER 1

INTRODUCTION

Skilled readers establish goals for reading that influence what they understand and remember about a text. Readers often generate their own goals, although sometimes a goal is established to meet a particular task demand (e.g., instructions to read to prepare for an essay or a test). Manipulating the relevance of text information is seen as one way to affect a reader's goals. Goals may improve understanding because they heighten the relevance of targeted text segments. The purpose of the present research was to investigate whether the specificity of pre-reading relevance instructions affects reading time and learning.

Relevance is the extent to which text segments are related to the reader's goals (Lehman & Schraw, 2002). Examples of relevance instruction include reading to answer pre-reading questions or objectives (Kaplan & Rothkopf, 1974; McCrudden, Schraw, & Kambe, 2005; Rothkopf & Billington, 1979; Rothkopf & Kaplan, 1972), use of inserted pre-questions (Shavelson, Berliner, Ravitch, & Loeding, 1974; Swenson & Kulhavy, 1974), use of inserted post-questions (Lapan & Reynolds, 1994; Reynolds, 1992; Rickards & Di Vesta, 1974; Rothkopf & Billington, 1974; van den Broek, Tzeng, Ridsen, Trabasso, & Basche, 2001), answering explanatory "why" questions (Pressley, Wood, Woloshyn, Martin, King & Menke, 1992; Siefert, 1993, 1994), self-explanation (Chi,

Leeuw, Chiu, & LaVancher, 1994), being asked to adopt a perspective during reading (Di Vesta & Di Cintio, 1997; Goetz, Schallert, Reynolds, & Radin, 1983; Schraw & Dennison, 1994; Schraw, Wade, & Kardash, 1993), and reading for a specific purpose such as to evaluate a story versus reading for entertainment (Kaakinen, Hyona, & Keenan, 2002; Lehman & Schraw, 2002; Linderholm & van den Broek, 2002; Narvaez, van den Broek, & Ruiz, 1999).

Guthrie and Mosenthal (1987) proposed a model for document search that is related, yet differs from the role of relevance in text comprehension. Their model has five steps for locating information beginning with the formation of a clear goal, inspect specific categories of text, detect and extract important information, integrate the information with prior knowledge and the goal, and finally recycling through each of the previous steps until the goal is met. However, Guthrie and Mosenthal point out that locating information in text and reading comprehension are different and involve different goals and types of processing. For instance, a frequent goal of reading documents in occupational settings is to locate specific facts rather than to build knowledge as usually demanded in classrooms (Kirsch & Guthrie, 1984). The goal of document search is usually to locate specific information (e.g., reading an airline schedule), and understanding of the entire document is usually not a part of the reader's intention (Guthrie, 1988).

The present research used a 1,200-word (approximately) informational narrative text entitled *Morinthia & Culatta: Geography, Commerce and People* that describes the attributes of two fictitious countries. The goal of this research was to examine the effect of specificity of relevance instructions on reading time and learning. It was predicted that

those receiving specific pre-reading instructions would have faster reading times than those receiving general pre-reading instructions or those in the control condition. In addition, it was predicted that those in the specific pre-reading condition would learn more than those in the general pre-reading condition, who would learn more than those in the control would.

The paper begins with a summary of research on relevance. Next is a brief description of the present study, followed by the literature review. Later, the purpose of the present research is described in detail. Two competing hypotheses and related predictions are proposed.

Previous Research on Relevance Instruction

Relevance instructions alter a reader's goals, which affect text comprehension. Previous research manipulated relevance by providing pre-reading instructions that ask the reader to focus on specific text segments or by assigning general instructions to the reader (e.g., read from an assigned perspective). In a series of three experiments, Rothkopf and Billington (1979) had high school students memorize pre-reading questions before reading a passage. Reading time per slide was recorded and in the third experiment, eye-tracking data was collected. Recall patterns were similar across three experiments. Those who memorized pre-reading questions recalled more of the relevant text (i.e., text related to the pre-reading questions) than those in the control, whereas participants in the control recalled more of the non-relevant text. In the first two experiments, there were no differences in overall reading time, although participants in the experimental conditions tended to have faster overall times. In the third experiment,

eye-tracking data showed that participants in the experimental conditions read relevant text slower than non-relevant text, yet read both types of text faster than those in the control. In sum, participants who memorized pre-reading questions learned more relevant text than non-relevant text and spent the same amount of time or less time reading compared to those in a control.

Goetz et al. (1983) examined the effect of perspective on recall and reading time. College students were assigned to one of three perspectives (burglar, homebuyer, or control) prior to reading a narrative about two boys ditching school. Participants recalled more perspective-relevant text than perspective-irrelevant text. Readers assigned to the burglar and homebuyer perspectives spent more time on perspective-relevant sentences and rated those sentences as more important. Perspective facilitated recall of relevant text, inhibited recall on non-relevant text, and led to differences in ratings of importance, replicating the results of Pichert and Anderson (1977). In addition, perspective led to longer reading time for relevant text and shorter reading time for non-relevant text.

Relevance has been distinguished from importance. Schraw et al. (1993) investigated the separate and combined effects of relevance and importance on text learning. College students read a modified, longer version of the passage used by Goetz et al. (1983) from an assigned perspective. Relevance increased recall of perspective-relevant text segments, replicating the findings of Pichert and Anderson (1977) and Goetz et al. (1983). Importance also increased recall of text segments. An interaction between relevance and importance suggested that readers relied primarily on relevance rather than importance when deciding which text segments to remember. When text was of high relevance, it was recalled equally well irrespective of its level of text-based importance.

Conversely, text of low relevance was recalled better if it was of high text-based importance rather than of low text-based importance. Schraw et al. (1993) concluded that readers initially use importance as their default criterion for assessing text, but then switch to a relevance criterion to guide processing if they develop criteria for distinguishing relevant from less relevant information.

Relevance has also been distinguished from interest. Schraw and Dennison (1994) examined the effects of relevance and interest (based on post-reading segment interest ratings) on recall. College students read the same passage as Schraw et al. (1993) from an assigned perspective. Relevance increased recall of perspective-relevant text segments, replicating earlier findings (Pichert & Anderson, 1977; Goetz et al., 1983; Schraw et al., 1993). Furthermore, perspective-relevant segments were rated as more interesting than perspective-irrelevant segments, indicating that interest changes as a function of relevance instructions.

Schraw et al. (1993) and Schraw and Dennison (1994) distinguished among the effects of relevance, importance, and interest; suggesting that relevance serves a compensatory function in that readers are less dependent on importance and interest when given relevance instructions. Relevance has also been shown to compensate for differences in reader characteristics. For example, Di Vesta and Di Cintio (1997) examined the effects of relevance and working memory span. College undergraduates read the same passage used by Goetz et al. (1983) from an assigned perspective. Recall for perspective-relevant text replicated the main effect for relevance reported by Goetz et al. (1983), Schraw et al. (1993), and Schraw and Dennison (1994). Furthermore, Di Vesta and Di Cintio (1997) found that relevance instructions compensated for working

memory span. While those in the high working memory span groups showed the highest recall scores, readers with the lowest working memory span benefited the most from relevance instructions. The low working memory span readers who received relevance instructions recalled more than the low working memory span readers who did not. The difference between these two groups was greater than the difference between those who did and did not receive relevance instructions in the medium and high working memory span groups. This finding was consistent with the compensatory function of relevance instructions proposed by Schraw et al. (1993) and Schraw and Dennison (1994).

Developmental differences among readers influence the effect of relevance instructions. van den Broek, Tzeng, et al. (2001) manipulated relevance using during-reading versus after-reading questions with 4th, 7th, 10th-graders and college students. van den Broek, Tzeng, et al. (2001) examined age and question location on learning. For college students, those receiving during-reading questions learned more than those receiving after-reading questions or no questions (i.e., control), which did not differ. In contrast, for 4th-graders, those receiving during-reading and after-reading questions learned less than those in the control. Questions help older readers focus their reading behaviors. In contrast, younger readers do not appear to benefit from relevance focusing questions, perhaps because these questions compete for limited resources during comprehension.

Relevance instructions influence on-line text-processing activities. Narvaez et al. (1999) examined the effect of reading purpose (i.e., read for study or for entertainment purposes) for reading on inference generation. College students read four short texts, two narrative and two expository. Think-aloud and recall data showed that readers whose

purpose was to read for study repeated words or phrases more frequently, recognized an inability to understand certain text segments, and made more evaluations than readers with an entertainment purpose. Reading purpose did not lead to statistically significant differences in recall or reading time (reading time and think-aloud data were collected in separate sessions). Narvaez et al. (1999) concluded that reading purpose influences inferential activity while reading both narrative and expository text, but that expository text appears to evoke study-type behaviors. In a subsequent study using think aloud techniques, van den Broek, Lorch, Linderholm, and Gustafson (2001) found that asking individuals to read for a study purpose increased both inference construction and overall memory for the text.

Reading purpose affects on-line reading activities when accounting for reader characteristics. Linderholm and van den Broek (2002) examined the effect of relevance on inferential processes with low- and high-working memory span college readers who read for either an entertainment or study purpose. Think-alouds showed that when reading for study purposes, all readers generated more explanatory inferences and paraphrases than when reading for entertainment purposes. When reading for entertainment purposes, all readers generated more opinions about the text and made more associations to information not related to text coherence. All of the readers modified their reading activities to fit the purpose but differences in working memory capacity led to the use of different strategies. For instance, low working memory capacity readers made fewer predictive inferences than high working memory capacity readers. In addition, those with a study purpose recalled more text than those with an entertainment purpose, replicating van den Broek, Lorch, et al. (2001).

Other on-line measures have been used to investigate the role of purpose on text comprehension. Kaakinen et al. (2002) examined the effects of purpose by low-, medium-, and high-working memory span readers on recall and eye fixation patterns. College students read a compare and contrast essay describing four remote countries. Prior to reading, participants were given the goal of deciding whether one of the countries, designated by the researchers, would be a good place to live. Text that referred to the assigned country was the relevant text. Individuals recalled significantly more relevant than irrelevant segments as in previous research (Di Vesta & Di Cintio, 1997; Goetz et al., 1983; Pichert & Anderson, 1977; Schraw et al., 1993; Schraw & Dennison, 1994). In addition, eye-fixation times were longer for relevant information than non-relevant information across working memory span groups.

Recent research examining relevance provides data on the role of pre-reading relevance instructions on text processing. In Experiment 1 of McCrudden et al. (2005), college students examined pre-reading questions before reading an expository text. The pre-reading questions targeted highly recallable segments (based on a norming study) from different categories of information (i.e., physiology vs. space travelers). A control condition received instructions to read the passage carefully. Free recall was used to measure learning and reading time per sentence was recorded. Consistent with previous research, pre-reading questions facilitated learning of relevant text and inhibited learning of non-relevant text. Furthermore, the pre-reading questions inhibited the recall of non-relevant, otherwise highly recallable text. For example, approximately 37% of physiology segments were recalled by those in the physiology condition, whereas 29% of the same segments were recalled by those in the space traveler condition. Similarly, 40% of space

traveler segments were recalled by those in the space traveler condition, whereas 24% of the same segments were recalled by those in the physiology condition. There were no differences in overall reading time among groups. In contrast to previous research, reading times for relevant sentences were marginally faster than non-relevant sentences.

The effect of relevance on text learning becomes less clear when examining the subtleties of relevance instructions directed towards targeted segments. In Experiment 2 of McCrudden et al. (2005), researchers examined the effect of specific pre-reading questions directed towards either topic sentences or supporting sentences on recall and reading time. A control condition received instructions to read the passage carefully. Topic sentence pre-reading questions facilitated recall of both relevant and non-relevant text as compared to supporting sentence pre-reading questions and control instructions. Of special interest, those receiving topic sentence instructions had faster reading times for both relevant and non-relevant sentences compared to those in the supporting sentence and the control conditions. These findings suggest that specific questions directed towards topic sentences enhance the learning of relevant and non-relevant text while decreasing reading time for relevant and non-relevant text.

The research described above suggests two main points. The first is that relevance enhances learning. Relevance instructions facilitate learning of relevant text segments as compared to non-relevant segments (Di Vesta & Di Cintio, 1997; Goetz et al., 1983; Kaakinen et al., 2002; Rothkopf & Billington, 1979; Schraw, et al., 1993; Schraw & Dennison, 1994). There is recent evidence that relevance facilitates learning of non-relevant text or text that is categorically related to relevant text (McCrudden et al., 2005). In addition, relevance influences inferential activities during on-line text processing. For

instance, Narvaez et al. (1999) found that relevance instructions influenced the likelihood of repeating and evaluating text, and recognizing gaps in understanding. Linderholm et al. (2002) found that relevance instructions influenced evaluative comments, generation of associations and connecting inferences, and paraphrases.

The second main point is that relevance affects reading time, although the empirical evidence is not consistent. Readers spend more time reading perspective-relevant text (Goetz et al., 1983; Kaakinen et al., 2002; Kaakinen, Hyona, & Keenan, 2003; Rothkopf & Billington, 1979), which coincides with better learning of perspective-relevant segments as compared to perspective-irrelevant segments. Readers also spend more time fixating on high-relevance compared to low-relevance segments (Kaakinen et al., 2002; Kaakinen et al., 2003; Rothkopf & Billington, 1979). There is evidence that relevance instructions can lead to faster reading time for relevant text compared to non-relevant text and that those receiving relevance instructions read non-relevant segments faster than those in a control condition (McCrudden et al., 2005; Rothkopf & Billington, 1979).

Henceforth the term *relevance effect* will be used to refer to the facilitative effect of relevance on learning. The relevance effect occurs whenever a reader designates text segments as relevant for meeting a particular goal, task, or learning outcome. These activities may include pre- or inserted-questions, instructions to focus on particular text segments, or providing the reader with a purpose for reading. Relevance may be induced by the reader or by goals and instructions established by someone other than the reader. The studies summarized above indicate that relevant segments are learned better, however results vary with respect to reading time data.

Purpose of the Present Study

The purpose of this study was to examine whether the specificity of relevance instructions affects reading time and learning. There were two main research questions. The first question was whether the specificity of pre-reading relevance instructions promotes learning of relevant segments by increasing reading time or through more efficient use of mental resources. General pre-reading relevance instructions increase reading time for relevant segments (Goetz et al., 1983; Kaakinen et al., 2002; Kaakinen et al., 2003). Results are mixed with respect to specific pre-reading relevance instructions. Rothkopf and Billington (1979) found that those receiving relevance instructions took longer to read relevant as compared to non-relevant text but read both type of text faster than those in a control. McCrudden et al. (2005) in Experiment 1 found no differences in overall reading times nor in reading times for relevant and non-relevant sentences, although relevant sentences were read marginally faster. McCrudden et al. (2005) in Experiment 2 found a decrease in overall reading time and in reading time for relevant and non-relevant sentences by those receiving relevance instructions directed towards topic sentences. The present study will investigate whether the specificity of pre-reading relevance instructions accounts for the inconsistent results found studies that manipulate relevance and measure reading time.

The second question was whether the specificity of pre-reading relevance instructions affects learning differently. Previous research indicates that both general and specific pre-reading questions facilitate learning of relevant segments and inhibit learning of non-relevant segments. However, results from several studies show that specific relevance instructions facilitate learning of text that is categorically related to relevant text (Lapan

& Reynolds, 1994; McCrudden et al., 2005; Reynolds & Anderson, 1982; Reynolds, Standiford, & Anderson, 1979). For instance, McCrudden et al. (2005) in Experiment 2 demonstrated that pre-reading questions directed towards topic sentences facilitate learning of relevant and non-relevant text. It is possible that pre-reading questions directed towards topic sentences, for example, produce a facilitative effect on the learning of both relevant and non-relevant text.

These questions are important for both theoretical and practical reasons. The present findings will enable educational researchers to better understand how relevance affects reading time and learning. Goetz et al. (1983) and Kaakinen et al. (2002) found that reading perspective increased reading time and recall for relevant text. The present study examines how pre-reading questions affect reading time and recall. It is unclear how specific pre-reading instructions will affect reading time. From a practical perspective, it is important to determine whether relevance instructions have a beneficial effect on the efficiency of reading comprehension. For example, it may be the case that some relevance instructions increase learning without increasing reading time because readers know in advance whether segments are relevant. An instructor can highlight the relevance of course material by including pre-reading questions prior to study, which helps learners focus on the most relevant information in a text and contributes to more efficient learning.

CHAPTER 2

LITERATURE REVIEW

The literature review provides background for the present study and consists of three main sections. The first section describes relevance and the relevance effect, which provides a framework for understanding the effect of relevance on text processing. The second section identifies types of relevance instructions that affect text learning. A taxonomy of relevance is proposed. The taxonomy will have two main components, each containing two subcomponents. Literature will be reviewed that demonstrates how relevance instructions within the taxonomy affect text processing. The third section includes a summary and main conclusions.

Relevance

Skilled readers establish goals for reading that influence what they understand and remember about a text. Relevance is the extent to which text segments are related to the reader's goals (Lehman & Schraw, 2002). Examples of relevance instruction include reading to answer pre-reading questions or objectives (Kaplan & Rothkopf, 1974; McCrudden et al., 2005; Rothkopf & Billington, 1979; Rothkopf & Kaplan, 1972), use of inserted pre-questions (Shavelson et al., 1974; Swenson & Kulhavy, 1974), use of inserted post-questions (Lapan & Reynolds, 1994; Reynolds, 1992; Rickards & Di Vesta,

1974; Rothkopf & Billington, 1974; van den Broek, Tzeng, et al., 2001), answering explanatory “why” questions (Pressley et al., 1992; Siefert, 1993, 1994), self-explanation (Chi et al., 1994), being asked to adopt a perspective during reading (Di Vesta & Di Cintio, 1997; Goetz et al., 1983; Lehman & Schraw, 2002; Schraw, et al., 1993), and reading for a specific purpose such as to evaluate a story versus reading for entertainment (Kaakinen et al., 2002; Linderholm & van den Broek, 2002; Narvaez et al., 1999).

Relevance Effect

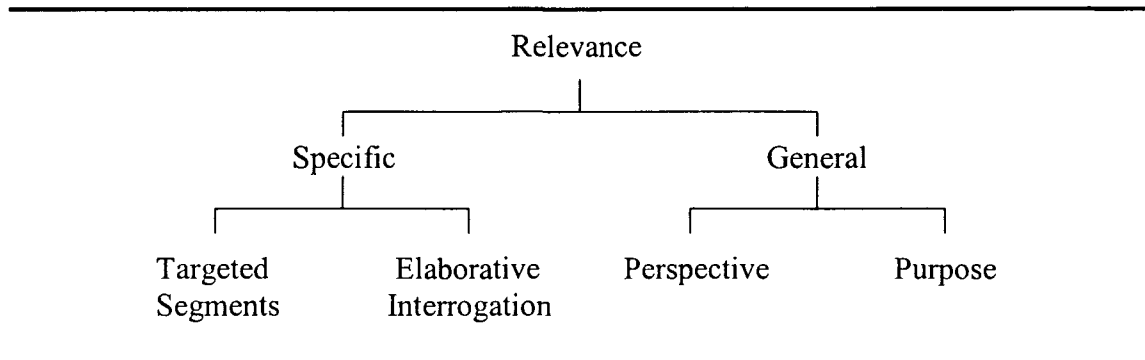
The term *relevance effect* refers to the facilitative effect of relevance on learning. The relevance effect occurs whenever text segments are designated as relevant to a particular goal, task, or learning outcome. These activities may include specific instructions such as pre-reading or inserted questions, or general instructions such as reading from an assigned perspective or providing the reader with a purpose for reading. Research has unambiguously demonstrated that relevance affects learning and on-line processing. Relevance facilitates learning of relevant text. However, empirical studies indicate that relevance does not uniformly affect reading time as results have shown increases, decreases, and no differences in reading time for relevant text. It appears that the effect of relevance on reading time is due in part to the type of relevance manipulation that is used.

Taxonomy of Relevance

A taxonomy was constructed to serve as a frame for identifying and organizing major categories and themes of relevance following a review of the literature. The specificity

level of the relevance instructions was used to divide the taxonomy into two main categories (see Figure).

Figure
Taxonomy of Relevance



Specific relevance instructions highlight very specific terms or sentences of a text. The two types of specific relevance instructions are targeted segment and elaborative interrogation instructions. Targeted segment instructions are “what” questions or are objectives. For example, inserted-questions that require identification of a proper name or a date provide explicit prompts that highlight the relevance of specific terms. Elaborative interrogation instructions are “why” questions that require explanatory responses based on text information or prior knowledge of a specific topic, such as explaining why palm trees grow in Florida but not in Nebraska.

General relevance instructions prompt readers to use a frame of reference while reading. The two types of general relevance instructions are perspective and purpose. Perspective instructions prompt readers to evaluate text from an assigned point of view, such as reading a narrative about a house inspection from the perspective of a homebuyer versus the perspective of a burglar. Purpose instructions prompt readers to display

reading behaviors (e.g., inference patterns) that are associated with a particular reading context. For instance, readers display different types of inferences when reading for study as compared to reading for entertainment (van den Broek, Lorch, et al., 2001).

Specific instructions explicitly prompt readers to focus on particular segments of text, whereas general instructions require the reader to rely on much more heavily on prior knowledge to infer the relevance of particular text segments. For example, students must read a compare and contrast essay describing two fictitious countries. Specific instructions prompt readers to focus on very specific segments of the text (e.g., “How often does it rain in Morinthia?”), whereas general instructions prompt readers to choose which country they would prefer to live in. The specific instructions explicitly cue a very specific segment of the text, whereas the general instructions require that the reader infer which segments are relevant to the stated purpose as function of background knowledge and personal preferences.

Specific Relevance Instructions

Specific relevance instructions prompt readers to focus on specific terms or specific sentences. Examples of specific relevance instructions include reading to answer pre-reading questions or objectives (Duchastel & Brown, 1974; Duell, 1974; Frase & Kreitzberg, 1975; Gagne & Rothkopf, 1975; Kaplan, 1974; Kaplan & Rothkopf, 1974; McCrudden et al., 2005; Peeck, 1970; Rothkopf & Billington, 1975a; Rothkopf & Billington, 1975b; Rothkopf & Billington, 1979; Rothkopf & Kaplan, 1972; Rothkopf & Koether, 1978), use of inserted pre-questions (Shavelson et al., 1974; Swenson & Kulhavy, 1974), use of inserted post-questions (Lapan & Reynolds, 1994; Reynolds,

1992; Reynolds & Anderson, 1982; Reynolds, Standiford, & Anderson, 1979; Rickards & Di Vesta, 1974; Rothkopf & Billington, 1974; van den Broek, Tzeng, et al., 2001), answering explanatory “why” questions (Pressley et al., 1992; Siefert, 1993, 1994; Willoughby, Wood, & Khan, 1994; Willoughby, Wood, Desmarais, Sims, & Kalra, 1997; Wood, Pressley, & Winne, 1990), and self-explanation (Chi et al., 1994). Pre-questions are inserted before the text to which they refer, whereas post-questions are inserted after the text to which they refer. The terms or sentences become relevant due to the instructions while text that is not prompted is considered non-relevant as it is not cued. Specific relevance instructions are divided into targeted segment and elaborative interrogation instructions.

Specific: Targeted Segments

Targeted segment instructions are in the form of questions or objectives and typically ask “what” questions. For example, “What is the name of the instrument used to measure temperature?” The question could also be an objective: Identify the instrument used to measure temperature. Targeted segment instructions help readers determine the relevance of specific text segments before or during reading. Much of the literature examines the effect of targeted segment instructions on recall and reading time for text passages.

In a series of three experiments, Rothkopf and Billington (1979) had high school students memorize pre-reading questions before reading a passage. Reading time per slide was recorded and in the third experiment, eye-tracking data was collected. There were one to three paragraphs per slide. Recall patterns were similar across three

experiments. Those who had memorized pre-reading questions recalled more of the relevant text than those in the control, whereas participants in the control recalled more of the non-relevant text. In the first two experiments, there were no differences in overall reading time, although participants in the experimental conditions tended to have faster overall times. The authors interpreted the reading time data in the first two experiments with caution because slides contained a mixture of relevant and non-relevant text. In the third experiment, eye-tracking data, which provided a more accurate measure of reading time for each type of text, showed that participants in the experimental conditions read relevant text slower than non-relevant text, yet read both types of text faster than those in the control. In sum, participants who memorized pre-reading questions learned relevant text better than non-relevant text and spent the same amount of time or less time reading compared to those in a control.

Reynolds, Standiford, and Anderson (1979) used a different manipulation of relevance than Rothkopf and Billington (1979) and found similar results. College students responded to post-questions, which are questions inserted after the portion of the text to which they pertain. The post-questions required readers to evaluate one of three specific categories of information (i.e., proper names, technical terms, numbers). Participants in three experimental conditions received post-questions targeting categorically different segments. Those in the control group were asked to read for understanding. All conditions read the same text. The post-test included the post-questions (i.e., inserted questions) from the experimental conditions and new items from the same categories as the inserted questions. Those who received inserted questions performed better, relative to controls, on post-test items that repeated the inserted

questions, and also on new post-test items from the same categories as the inserted questions. Participants who received inserted questions spent more time on the parts of the text that contained the type of information needed to answer the questions. Similar to Rothkopf and Billington (1979), participants spent additional time on relevant text and learned that information better. In contrast to Rothkopf and Billington (1979), those in the experimental conditions had longer reading times than those in the control.

This research suggests there is a relationship between attention and text learning. However, the nature of the relationship is unspecified. Different measures of attention can be used to explore the nature of attention during reading. Reynolds and Anderson (1982) replicated the findings of Reynolds et al. (1979) using college students and the same experimental materials and instructions. In addition, attention duration and intensity were measured. Reading time was used to measure attention duration. Reaction time to a secondary task (depressing a key as quickly as possible when hearing a tone) while completing a primary task (read for comprehension) was used to measure attention intensity. Reaction time for a secondary task is slower when greater attention is allocated towards the primary task (Kahneman, 1973). It was predicted that reaction time would be slower as participants read relevant text because attention would be more intense. Results matched the predictions. Reading time for relevant text was greater than reading time for non-relevant text. Reaction times were longer for question-relevant text, suggesting that attention intensity is greater for relevant text. Overall, as readers progressed through the text, reading time for relevant text decreased and reaction time increased, before eventually decreasing. The duration of attention decreases while

intensity of attention increases for relevant text, up to a point, indicating that reading efficiency increases as readers progress through a text.

The research on targeted segments unambiguously indicates that text made relevant by relevance instructions is learned better than non-relevant text. However, the relationship between reading time and the learning of relevant text is not as clear. In McCrudden et al. (2005) in Experiment 1 college students rated pre-reading questions for interest before reading an expository text. The pre-reading questions targeted highly recallable segments (based on a norming study) from different categories of information (i.e., physiology vs. space travelers). A control condition received instructions to read the passage carefully. Free recall was used to measure learning and reading time per sentence was recorded. Consistent with previous research, pre-reading questions facilitated learning of relevant text and inhibited learning of non-relevant text. Furthermore, the pre-reading questions inhibited the recall of non-relevant, otherwise highly recallable text. There were no differences in overall reading time among groups. In contrast to previous research, reading times for relevant sentences were marginally faster than non-relevant sentences.

The effect of relevance on text learning becomes less clear when examining the subtleties of relevance instructions directed towards targeted segments. McCrudden et al. (2005) in Experiment 2 examined the effect of specific pre-reading questions directed towards either topic or supporting sentences on recall and reading time with college readers. A control condition received instructions to read the passage carefully. Free recall was used to measure learning and reading time per sentence was recorded. Topic sentence pre-reading questions facilitated recall of both relevant and non-relevant text

compared to supporting sentence pre-reading questions or the control instructions. Of special interest, the topic sentence questions led to faster reading times for both relevant and non-relevant sentences compared to supporting sentence questions and the control instructions. These findings suggest that topic sentence questions can enhance the learning of relevant and non-relevant text while decreasing reading time for relevant and non-relevant text.

Differences in reader characteristics have been found in how targeted segment relevance instructions are applied. Lapan and Reynolds (1994) used the same experimental materials as Reynolds et al. (1979) and Reynolds and Anderson (1982) to study the effects of inserted questions on more and less successful college readers (as determined by composite vocabulary and comprehension scores) when changing the relevance halfway through a passage. In the first half of the reading, questions referred to proper names only or to control segments only. In the second half of the text, the type of inserted question reversed. For instance if questions in the first half dealt with proper names, then questions in the second half referred to control segments. Thus the category of text that was relevant in the first half of the text differed from the second half of the text. Results replicated their previous findings. Post-questions facilitated recall of relevant text and on new post-test items from the same categories as the inserted questions. Reading times for relevant text were longer than for non-relevant text. This pattern held true for the more successful readers even when the relevance of segments changed halfway through the text.

Although the general trends were similar, the reading patterns and learning outcomes of more and less successful readers differed. For example, in the first half of the text the

more successful readers identified relevant text after exposure to four or five inserted questions (out of 12) whereas the less successful readers required seven or eight questions before allocating attention to relevant text. When the relevance changed during the second half of the text, the more successful readers shifted attention towards the new type of text while the less successful readers did not change their approach. In sum, the more successful readers were able to differentiate relevant from non-relevant text better and more efficiently, demonstrating greater metacognitive skill.

The studies reviewed on targeted segments lead to three general conclusions. First, relevance instructions that target segments facilitate recall of relevant text. In addition, this type of relevance instruction can facilitate learning of categorically similar text (Reynolds & Anderson, 1982; Reynolds et al., 1979) and non-targeted text (McCrudden et al., 2005). Targeted segment instructions help readers distinguish relevant from non-relevant text, and learn relevant information better.

Second, the relationship between attention and learning is unclear. Relevance instructions that target segments can increase (Lapan & Reynolds, 1994; Reynolds & Anderson, 1982; Reynolds et al., 1979; Rothkopf & Billington, 1979), decrease (McCrudden et al., 2005), or have no significant effect (McCrudden et al., 2005) on attention duration for relevant text in relation to non-relevant text. Furthermore, overall reading time typically decreases as the reader progresses through a text. Attention intensity is greater for relevant text segments.

Third, differences in reader characteristics can mediate the effect of relevance instructions that target segments. Lapan and Reynolds (1994) found that this type of relevance instruction had a more pronounced beneficial effect on more successful

readers. More successful readers distinguish relevant from non-relevant text and adjust to changing task demands more quickly during reading.

Specific: Elaborative Interrogation

Elaborative interrogation instructions prompt readers to relate new information to prior knowledge or to construct within-text inferences by answering “why” questions. For example, a paragraph includes the following fact: Native Americans from the Pacific Northwest lived in houses made from wood and had slanted roofs. The corresponding why question could be: Why did Native Americans from the Pacific Northwest have slanted roofs? Answering this question involves knowing that the slanted roofs prevented rainfall from accumulating on the roof and the climate permitted the growth of trees, which produced timber for housing. The purpose of elaborative interrogation is to improve learning by prompting readers to build relationships to prior knowledge or to previously read text. Elaborative interrogation is assumed to be effective because relating new information to prior knowledge and constructing within-text inferences facilitates text understanding (Kintsch, 1998).

Woloshyn, Willoughby, Wood, and Pressley (1990) had college students read six-sentence factual paragraphs about five universities. Participants in the elaborative interrogation condition were taught to ask and answer “why” questions after reading each sentence. Participants in each condition read and studied the text for the same amount of time. Those in the elaborative interrogation condition recalled more facts and matched more target facts with each respective university than those in the control condition.

Next, researchers examined whether learner generated elaborations or text-provided elaborations would affect learning differently. Wood, Pressley, and Winne (1990) had 4th- through 8th-grade students read six-sentence factual paragraphs about nine animals. Those in the control condition simply read and studied the sentences. Those in the elaborative interrogation condition answered “why” questions following each sentence. Those in the explanatory elaboration condition were provided additional elaborations (e.g., why an animal lived in a certain habitat) after each sentence. Those in the elaborative interrogation condition had higher cued recall than those receiving explanatory explanations and those in the control, which did not differ.

Research supported the idea that reader generated elaboration facilitates recall better than text-provided elaborations but there was little data comparing the effects of elaborative interrogation on inferential learning. Seifert (1993) noted that materials used in previous studies presented paragraphs containing many facts but that the materials failed to include paragraphs organized according to a text structure, making it difficult to assess other types of learning. Seifert had middle school students read three, 6-paragraph passages about animals. Each paragraph contained one topic sentence and several supporting sentences. The study included four conditions: underline only, underline with provided elaboration, generate elaboration, and elaborate with study notes. Those in the underline-only condition underlined the most important idea of each paragraph. Those in the underline with provided elaboration condition also underlined the most important idea of each paragraph. In addition, each paragraph contained an extra sentence linking a target fact to a passage read in a previous study session. Those in the generate elaboration condition read and answered “why” questions for each paragraph. Those in

the elaborate with study sheet condition answered “why” questions and used their notes from a previous session. Those who generated elaborations had better memory for main ideas as compared to those in the underline only condition. However, only those in the underline with provided elaboration condition did significantly better on an inference problem than those in the underline only condition. These results suggest that reader generated elaborations aid memory for main ideas, yet text-supplied elaborations in combination with response behaviors (e.g., underlining) help readers generate inferences.

Researchers examined the interactive effect of elaborative interrogation and prior knowledge. Willoughby, Wood, and Khan (1994) used elaborative interrogation with high and low knowledge college students who read 40 facts about ten islands from a fantasy book series. The high knowledge students had read books in the series but did not have specific knowledge of the facts studied. Those in the elaborative interrogation conditions answered “why” questions after reading each sentence. Those in a repetition conditions repeated each sentence for understanding. Those with high knowledge in the elaborative interrogation condition matched more facts to the respective islands than those with high knowledge in the repetition condition. There was a main effect for knowledge such that those in the high knowledge conditions performed better than those in the low knowledge conditions. The difference between those in the low knowledge elaborative interrogation and repetition conditions was not significant. Answering “why” questions only enhanced fact learning for learners with high prior knowledge.

Oftentimes students have low prior knowledge about certain topics such as human physiology. Providing elaborations within the text is one way to supplant low prior knowledge. However, providing all of the potential relationships between ideas and

concepts within a text would make the text unmanageably long. An alternative to text-based elaboration is reader-based elaboration. Self-explanation is a learner-initiated strategy that can be used in multiple contexts. Self-explanation can be considered a learner-generated form of elaborative interrogation that involves integrating new knowledge with existing knowledge. Chi et al. (1994) studied the effect of self-explanation using an informationally dense text on the human circulatory system. Eighth-graders were asked to self-explain (without extensive training) after reading each line of the 101-sentence text. Those in the control condition were asked to read the same text twice but were not asked to self-explain. Students who were prompted to self-explain demonstrated a greater gain from the pretest to the posttest on items assessing verbatim facts, comprehension inferences (integrate information from two or more lines of text), knowledge inferences (use of prior knowledge), and items about system-wide properties of the circulatory system. In addition, students in the self-explain condition who generated a greater number of self-explanations demonstrated greater understanding than those who generated fewer self-explanations.

It is possible that responding to qualitatively different types of questions that pertain to text leads to differences in learning. Seifert (1994) compared the effect of elaborative interrogation to verbatim questions on memory for main ideas. Seventh graders read a 16-paragraph text about four animals. Each paragraph contained a topic sentence followed by several supporting sentences that clarified the topic sentence. Those in the verbatim condition responded to questions for each paragraph that required the identification of the main idea. Those in the elaborative interrogation condition responded to “why” questions for each paragraph that required the use of prior

knowledge from a previous study session. After reading, participants matched the animals with the respective characteristics, which were paraphrased from the text. Those in the elaborative interrogation condition outperformed those in the verbatim condition. Elaborative interrogation facilitated memory for facts embedded in prose, supporting the claim that responding to qualitatively different types of questions that pertain to text leads to differences in learning.

The studies reviewed on elaborative interrogation lead to three general conclusions. First, self-explanation after each sentence of informationally dense text leads to greater factual and inferential learning than rereading (Chi et al., 1994). Furthermore, generating a greater number of self-explanations corresponds with greater understanding than fewer self-explanations. Self-explanation is an effective learner-generated strategy that can compensate for individual differences in prior knowledge and text characteristics.

Second, elaborative interrogation facilitates recall and memory for main ideas most effectively when high background knowledge readers integrate text with prior knowledge (Seifert, 1993, 1994; Willoughby et al., 1994). In the absence of prior knowledge, self-generated elaboration tends to facilitate learning but to a lesser extent.

Third, self-generated elaborations facilitate memory for facts and main ideas better than provided elaborations, answering verbatim questions, underlining only, rereading, or a control (Chi et al., 1994; Seifert, 1993, 1994; Willoughby et al., 1994; Woloshyn et al., 1990; Wood et al., 1990). This generalization is consistent with levels of processing theory, which indicates that the act of generating an answer increases the memorability of the information relative to other text segments (Glover, Bruning, & Plake, 1982). Text-

provided elaborations in combination with underlining by the reader can facilitate inferential learning (Seifert, 1993).

General Relevance Instructions

General relevance instructions prompt readers to focus on broad categories of information or to use an appropriate approach during a reading task. Examples of general relevance instructions include being asked to adopt a perspective during reading (Di Vesta & Di Cintio, 1997; Goetz et al., 1983; Lehman & Schraw, 2002; Pichert & Anderson, 1977; Schraw & Dennison, 1994; Schraw et al., 1993) and reading for a specific purpose such as to evaluate a story versus reading for entertainment (Kaakinen et al., 2002; Lehman & Schraw, 2002; Linderholm & van den Broek, 2002; Narvaez et al., 1999; Reynolds, Trathen, Sawyer, & Shepard, 1993; van den Broek, Lorch, et al., 2001). The reader must determine whether individual text segments are relevant using the assigned perspective or purpose. General relevance instructions can be divided into perspective and purpose.

General: Perspective

Perspective instructions prompt readers to focus on broad categories of information by invoking a particular perspective. The reader uses general orienting instructions that highlight the relevance of general types of text segments depending on the assigned perspective. An example of perspective is asking a student to imagine that he/she is a blacksmith in Boston, a farmer in the countryside, or a politician in England before reading a passage on the American Revolution. Establishing the relevance of particular

segments involves inferential activities and typically a certain degree of prior knowledge. An assigned perspective serves to activate a high level schema that organizes text in a meaningful way and affects text learning by prompting readers to focus on a general class of information.

Pichert and Anderson (1977) examined the effect of perspective by asking participants to read for particular types of information and to rate idea units in the text for importance. College students were assigned to one of three perspectives (burglar, homebuyer, or control) prior to reading the narrative about two boys ditching school. Participants recalled more of the information relevant to their own perspective than they did of the other perspective-relevant information on tests of both immediate and delayed (7 days) recall. Ratings of importance varied across perspectives with relevant segments receiving the highest ratings. Perspective facilitates recall and increases importance ratings of relevant text. Furthermore, perspective inhibits recall and decreases importance ratings of non-relevant text.

Goetz et al. (1983) examined the effect of perspective on recall and reading time with experimental materials and directions that were similar to Pichert and Anderson (1977). College students were assigned to one of three perspectives prior to reading a narrative about two boys ditching school. Participants recalled more perspective-relevant text than perspective-irrelevant text. In addition, readers receiving the burglar and homebuyer perspectives spent more time on perspective-relevant sentences and rated these sentences as more important. Perspective facilitated recall of relevant text and inhibited recall on non-relevant text, and led to differences in ratings of importance, replicating the results of

Pichert and Anderson (1977). In addition, perspective led to longer reading time for relevant text and shorter reading time for non-relevant text.

Relevance (i.e., perspective) and importance were related positively in Pichert and Anderson (1977) and Goetz et al. (1983). To distinguish relevance from importance, Schraw et al. (1993) examined the separate and combined effects of relevance and importance on text learning. College students read a modified version of the passage used by Goetz et al. (1983) from an assigned perspective. Relevance increased recall of perspective-relevant text, replicating the findings of Pichert and Anderson (1977) and Goetz et al. (1983). Importance also increased recall of text. An interaction between relevance and importance suggested that readers relied primarily on relevance rather than importance when deciding which text segments to remember. When text was of high relevance, it was recalled equally well irrespective of its level of text-based importance. Conversely, text of low relevance was recalled better if it was of high text-based importance rather than of low text-based importance. Schraw et al. (1993) concluded that readers initially use importance as their default criterion for assessing text, but then switch to a relevance criterion to guide processing if they develop criteria for distinguishing relevant from less relevant information.

Relevance has also been distinguished from interest. Schraw and Dennison (1994) examined the effects of relevance and interest (based on post-reading segment interest ratings) on recall. College students read the same passage as Schraw et al. (1993) from an assigned perspective. Relevance increased recall of perspective-relevant text segments, replicating earlier findings (Pichert & Anderson, 1977; Goetz et al., 1983; Schraw et al., 1993). Furthermore, perspective-relevant segments were rated as more

interesting than perspective-irrelevant segments, indicating that interest changes as a function of relevance instructions.

The effects of perspective are amplified when taking into account differences in reader characteristics. Di Vesta and Di Cintio (1997) examined the effects of perspective and working memory span on recall. College undergraduates read the same passage used by Goetz et al. (1983) from an assigned perspective. Results for perspective-relevant recall replicated the main effect for relevance reported in previous studies (Pichert & Anderson, 1977; Goetz et al., 1983; Schraw et al., 1993; Schraw & Dennison, 1994). Furthermore, Di Vesta and Di Cintio (1997) found that relevance instructions compensated for working memory span. Readers with the lowest working memory span benefited the most from relevance instructions. This finding was consistent with the compensatory function of relevance instructions proposed by Schraw et al. (1993) and Schraw and Dennison (1994).

The studies reviewed that involve perspective lead to four general conclusions. First, perspective facilitates recall of perspective-relevant text and inhibits recall of perspective-irrelevant text. This occurred in each of the studies. Perspective prompts readers to distinguish relevant from non-relevant text, facilitating recall of relevant text segments.

Second, perspective differs from importance (Pichert & Anderson, 1977; Schraw et al., 1993) and interest (Schraw & Dennison, 1994). Importance serves as a default strategy for determining relevance, but readers then switch to a relevance criterion to guide processing in lieu of importance. Perspective increases interest in relevant text. Importance and interest are not invariant characteristics of text. Rather, both importance

and interest vary as a function of relevance such that relevant segments tend to receive higher importance and interest ratings than non-relevant text.

Third, perspective can compensate for differences in reader characteristics. In DiVesta and Di Cintio (1997), even though all readers benefited from assigned perspectives, readers with the lowest working memory spans benefited the most. Perspective helps readers focus on relevant information and compensate for working memory limitations.

Fourth, perspective leads to longer reading time for perspective-relevant text and shorter reading time for perspective-irrelevant text (Goetz et al., 1983). When perspective-relevant text is encountered, readers spend more time reading this information. It is unclear why perspective-relevant text is read longer than perspective-irrelevant text. One possibility is that relevant text may be re-read once it is identified as relevant. For instance, a reader may identify a sentence as relevant only after having read two-thirds of the sentence. Once it is identified as relevant, the reader may re-inspect the sentence.

General: Purpose

Purpose instructions prompt readers to comprehend text for a designated purpose. The reader uses general orienting instructions that highlight the relevance of general types of text segments depending on the assigned purpose. For example, three students are asked to read a magazine article. One student is asked to read the article for enjoyment, another is asked to be able to summarize it, and another is asked to take a test on the information in the article. The types of inferential activities employed by each of

the students may differ as a function of their relevance instructions. An assigned purpose serves to influence the inferential activities associated with a goal-directed search for meaning (van den Broek, Lorch, et al., 2001).

Reading purpose affects on-line text-processing activities. Narvaez et al. (1999) studied the effect of purpose (i.e., read for study or for entertainment purposes) for reading on inference generation. College students read four short texts, two narrative and two expository. Think-aloud and recall data showed that readers whose purpose was to read for study repeated words or phrases more frequently, recognized an inability to understand certain text segments, and made more evaluations than readers with an entertainment purpose. Reading purpose did not lead to statistically significant differences in recall or reading time (reading time and think-aloud data were collected in separate sessions). Narvaez et al. (1999) concluded that reading purpose influences inferential activity while reading both narrative and expository text, but that expository text appears to evoke study-type behaviors.

In a similar study, van den Broek, Lorch, et al., (2001) examined the effect of purpose on inference generation and overall memory for four expository texts. Data from think-aloud protocols indicated different patterns of inferential activities when reading for study or for entertainment purposes. Individuals with a study purpose demonstrated greater use of explanatory and predictive inferences, paraphrasing, and repetition. Individuals with an entertainment purpose generated more opinions about the text and made more associations to information not related to text coherence. Similar to Narvaez et al. (1999), purpose led to different patterns of inferential activities. In addition, those with a study purpose recalled more text than those with an entertainment purpose.

Other on-line measures have been used to investigate the role of purpose on text comprehension. Kaakinen et al. (2002) examined the effects of purpose by low-, medium-, and high-working memory span readers on recall and eye fixation patterns. College students read a compare and contrast essay describing four remote countries. Prior to reading, participants were given the goal of deciding whether one of the countries, designated by the researchers, would be a good place to live for an extended period of time. Text that referred to the assigned country was the relevant text. Individuals recalled significantly more relevant than irrelevant segments as in previous research (Di Vesta & Di Cintio, 1997; Goetz et al., 1983; Pichert & Anderson, 1977; Schraw et al., 1993; Schraw & Dennison, 1994). In addition, eye-fixation times were longer for relevant information than non-relevant information across working memory span groups. Kaakinen et al. (2002) did not distinguish reading purpose from reading perspective, although both variables were present based on the criteria used in the present literature review. As part of the reading purpose, both conditions were asked to read the text from the perspective of a research scientist. The Kaakinen et al. (2002) was classified as under general purpose because it is more consistent with the criteria for general purpose and perspective was constant across conditions.

Reading purpose affects on-line reading activities when accounting for reader characteristics. Reynolds, Trathen, Sawyer, and Shepard (1993) assigned good and poor sixth-graders (based on reading ability) a reading purpose before reading. Participants were asked to remember either the color of items, foods and drinks, or the main ideas (as determined by the reader). Dependent measures were attention duration (i.e., reading time), attention intensity (i.e., reaction time to a secondary task), and cued recall.

ANOVA's indicated similar trends to previous research. Participants spent more time reading text relevant to the assigned purpose and learned those segments better. There were no differences for attention intensity. Researchers also conducted hierarchical regression analyses to separate the individual contributions of relevance and attention on learning. Good readers showed significant relations between relevance and learning and between relevance and attention allocation; but showed no significant relation between attention and learning. Poor readers showed no relations between or among relevance, attention, and learning. Results from the regression analyses failed to produce a 1:1 correspondence between attention and learning, illustrating their illusive relationship. Interview data indicated that good readers reported active interaction with the text (e.g., looking for text signals, monitoring comprehension) while poor readers reported passive interaction (e.g., lack of self-monitoring). Together, these results suggest that good and poor readers adjust to reading purpose differently.

Linderholm and van den Broek (2002) examined the effect of relevance on inferential processes with low- and high-working memory span college readers who read for either an entertainment or study purpose. Think-alouds showed that when reading for study purposes, all readers generated more explanatory inferences and paraphrases than when reading for entertainment purposes. When reading for entertainment purposes, all readers generated more opinions about the text and made more associations to information not related to text coherence. All of the readers modified their reading activities to fit the purpose but differences in working memory capacity led to the use of different strategies. For instance, low working memory capacity readers made fewer predictive inferences than high working memory capacity readers. In addition, those with a study purpose

recalled more text than those with an entertainment purpose, replicating van den Broek et al. (2001).

Purpose can compensate for text variables such as text coherence. Lehman and Schraw (2002) examined the effects of relevance and coherence on measures of shallow (fact multiple-choice items & free recall) and deep (causal arguments & a holistic interpretation score for an essay) text learning. Participants read a historical narrative on the explorations of the Arctic Ocean between Greenland and Alaska. Instructions were to “pay particular attention to the explorers who made important discoveries and what these explorers discovered.” Researchers rearranged the chronological order of paragraphs in the text to create coherence breaks. Participants with a reading purpose wrote essays containing more causal arguments and had higher holistic interpretation scores. Breaks in text coherence interfered with measures of shallow processing. Relevance instructions (i.e., reading purpose) compensated for low text coherence and readers with an assigned purpose demonstrated better understanding of the text. These results were consistent with several previous studies reporting compensatory effects of relevance (Di Vesta & Di Cintio, 1997; Schraw et al., 1993; Schraw & Dennison, 1994).

The studies reviewed on purpose lead to four general conclusions. First, purpose facilitates learning of text. van den Broek, Lorch, et al. (2001) and Linderholm and van den Broek (2002) found that reading for study led to greater recall than when reading for entertainment. Kaakinen et al. (2002) and Reynolds et al. (1993) found that purpose led to longer reading times for relevant text and participants learned those segments better. Lehman and Schraw (2002) found that purpose facilitated deep processing as reflected in essay scores. In Narvaez et al. (1999), there were no recall differences between

conditions reading for study or entertainment yet the absence of a control condition prevents comparison to the experimental conditions.

Second, purpose affects inference generation. Narvaez et al. (1999), van den Broek, Lorch, et al., (2001), van den Broek, Tzeng, et al. (2001), and Linderholm and van den Broek (2002) each found that reading for study purposes led to different inferential activities than reading for entertainment purposes. Reading for study tended to produce more explanatory inferences whereas reading for entertainment led to the generation of more opinions about the text.

Third, the effects of purpose differ when accounting for differences in characteristics among readers. Reynolds et al. (1993) found that higher reading ability readers benefited more from reading purpose than those with lower reading ability. Linderholm and van den Broek (2002) found that while both high- and low-working memory span readers modified their inferential activities as a result of reading purpose, the high-working memory span individuals displayed greater recall and use of inferences along with more metacognitive statements.

Fourth, purpose can compensate for text characteristics. Lehman and Schraw (2002) found that purpose compensated for breaks in text coherence. Purpose helps readers understand text when faced with text variables that interfere with learning.

Summary of Relevance Research Findings

Relevance is the extent to which text segments are related to the reader's goals (Lehman & Schraw, 2002). Readers develop criteria for determining the relevance of text segments. These criteria facilitate the learning of relevant text and can inhibit

learning of non-relevant text. The facilitative effect of relevance on learning is referred to as the relevance effect. The relevance effect occurs whenever a reader designates text segments as relevant for meeting a particular goal, task, or learning outcome.

The specificity of relevance instructions differs. Specific relevance instructions prompt readers to focus on specific terms or sentences. Targeted segment and elaborative interrogation are two main types of specific relevance instructions. *Targeted segment instructions* are in the form of questions or objectives and typically ask “what” questions. Targeted segment instructions help readers determine the relevance of specific text segments before or during reading. *Elaborative interrogation instructions* prompt readers to relate new information to prior knowledge or to construct within-text inferences by answering “why” questions. These questions require the reader to construct reasons to explain why a portion of text is true. Elaborative interrogation prompts readers to build relationships to prior knowledge or previously read text.

General relevance instructions prompt readers to focus on text that is considered to be consistent with a particular perspective or purpose. General relevance instructions are less explicit than specific relevance instructions. Establishing the relevance of particular segments often involves inferential activities and prior knowledge. Perspective and purpose are two main types of general relevance instructions. *Perspective instructions* prompt readers to focus on broad categories of information by invoking a particular perspective. Perspective activates a high level schema that organizes text in a meaningful way. *Purpose instructions* prompt readers to comprehend text for a designated purpose. Purpose highlights the relevance of general types of text segments through general orienting instructions. Inferential activities differ as a function of purpose. An assigned

purpose influences the use inferential activities that are associated with a goal-directed search for meaning (van den Broek, Lorch, et al., 2001)

Main Conclusions

The literature reviewed leads to four main conclusions about the effect of relevance on text processing. The first conclusion is that relevance instructions facilitate learning of relevant text. All of the studies support this claim. Specific and general relevance instructions each display a facilitative effect on learning of relevant text. Results differ somewhat for non-relevant text. Studies have shown that relevance instructions typically inhibit learning of non-relevant text. This finding has been replicated consistently with general instructions and quite frequently with specific instructions. However, some studies using specific relevance instructions have indicated a facilitative effect for text that is categorically related to relevant text (Lapan & Reynolds, 1994; McCrudden et al., 2005; Reynolds & Anderson, 1982; Reynolds et al., 1979).

The second conclusion is that relevance affects reading time. One distinction between general and specific relevance instructions is that general instructions lead to slower overall reading time, whereas results vary with specific instructions. Inconsistent results in overall reading time are found in studies in which targeted segment instructions were manipulated. Post-questions have led to increases in overall reading time (Lapan & Reynolds, 1994; Reynolds & Anderson, 1982; Reynolds et al., 1979) whereas pre-reading questions have lead to decreases or no differences in reading time (McCrudden et al., 2005; Rothkopf & Billington, 1979).

Another distinction is that general instructions lead to slower reading time for relevant text whereas specific instructions do not uniformly affect reading time for relevant text. Inconsistent results in reading time for relevant text are found in studies in which targeted segment instructions were manipulated. Post-questions have led to increases in reading time for relevant text (Lapan & Reynolds, 1994; Reynolds & Anderson, 1982; Reynolds et al., 1979) whereas pre-reading questions have led to decreases or no differences in reading time for relevant text (McCrudden et al., 2005; Rothkopf & Billington, 1979).

The third conclusion is that relevance instructions invoke different reading behaviors for meeting the demands of a task. Specific instructions are more explicit than general instructions. For instance, elaborative interrogation questions explicitly prompt readers to relate new information to prior knowledge or to construct within-text inferences. General instructions provide a situational context that prompts readers to instantiate a particular perspective (e.g., read from the perspective of a homebuyer) or to invoke particular reading behaviors (e.g., read for a study purpose), which signal the relevance of particular text segments less explicitly.

The fourth conclusion is that specificity of relevance affects learning differently when accounting for differences in reader characteristics. General perspective instructions have been shown to compensate for working memory span. In Di Vesta and Di Cintio (1997), readers with varying levels of working memory span benefited from general perspective instructions. However, those with low working memory span benefited the most from relevance instructions. General purpose instructions have proven more beneficial for high ability readers. Reynolds et al. (1993) found that high ability

college readers benefited most from general purpose instructions. It is possible that higher ability readers were able to distinguish relevant from non-relevant text more quickly. There is evidence that specific relevance instructions are more beneficial for higher ability readers. Lapan and Reynolds (1994) found that high ability college readers benefited most from post-questions.

The Present Study

The purpose of this study was to examine whether the specificity of relevance instructions affects reading time and learning. There were two main research questions. The first question was whether the specificity of pre-reading relevance instructions promotes learning of relevant segments by increasing reading time or through more efficient use of mental resources. Those receiving general relevance instructions demonstrate slower overall reading times compared to those in a control (Goetz et al., 1983; Reynolds, Trathen, Sawyer, & Shepard, 1993; Kaakinen et al., 2002; Kaakinen et al., 2003). Specific relevance instructions have led to mixed results. This inconsistency may result from a subtle yet substantive difference in the types of specific relevance instructions. Post-questions are questions inserted after the text to which they pertain. Those receiving post-questions demonstrate slower overall reading times than those in a control (Lapan & Reynolds, 1994; Reynolds, Standiford, & Anderson, 1979; Reynolds & Anderson, 1982). Those receiving pre-reading questions, on the other hand, demonstrate faster overall reading time or no difference in overall reading time compared to those in a control (McCrudden et al., 2005, Rothkopf & Billington, 1979).

According to the literature, general relevance instructions lead to slower overall reading time whereas pre-reading questions lead to faster or no differences in reading time. To the author's knowledge, no studies have compared reading time for specific and general relevance instructions, as defined in the literature review, in the same experiment. The present study will investigate whether the specificity of pre-reading relevance instructions contributes to inconsistent empirical results in reading time.

The second question was whether the specificity of pre-reading relevance instructions affects learning differently. Previous research indicates that both general instructions and specific pre-reading questions facilitate learning of relevant segments and inhibit learning of non-relevant segments. However, several studies have found that specific relevance instructions facilitated learning of text that is categorically related to relevant text (Lapan & Reynolds, 1994; McCrudden et al., 2005; Reynolds & Anderson, 1982; Reynolds, Standiford, & Anderson, 1979). Results from McCrudden et al. (2005, Experiment 2) demonstrate that the nature of the information targeted by specific pre-reading questions produces a general facilitative effect on learning. It is possible that pre-reading questions directed towards topic sentences produce a facilitative effect on the learning of both relevant and non-relevant text. To the author's knowledge, no studies have compared learning outcomes for specific and general relevance instructions, as defined in the literature review, in the same experiment. Furthermore, the majority of studies have measured learning with some form of recall. In the present study, learning was measured with recall and an essay that was designed to measure understanding of within- and across-topic text relationships.

This question is important for both theoretical and practical reasons. The present findings will enable educational researchers to better understand how relevance affects reading time and learning. Goetz, et al. (1983) and Kaakinen et al. (2002) found that reading perspective increased reading time and recall for relevant text. The present study examines how pre-reading questions affect reading time and recall. It is unclear how specific pre-reading instructions will affect reading time. From a practical perspective, it is important to determine whether relevance instructions have a beneficial effect on the efficiency of reading comprehension. For example, it may be the case that some relevance instructions increase learning without increasing reading time because readers know in advance whether segments are relevant. An instructor can highlight the relevance of course material by including pre-reading questions prior to study, which helps learners focus on the most relevant information in a text and contributes to more efficient learning.

Hypotheses

This study was designed to evaluate two competing views of relevance referred to as the *relevance non-specificity* and *relevance specificity* hypotheses. According to the relevance non-specificity hypothesis, specific and general relevance instructions do not produce differences in reading time, yet both lead to slower reading times than control instructions. According to this view, relevance instructions increase reading time because additional time is spent evaluating whether a segment is relevant. The reader must evaluate each potentially relevant segment to determine whether it is relevant to the reading task. Thus, the time intensive process of evaluating segments as relevant is the

presumed mechanism that increases learning relative to a control. This hypothesis is consistent with previous findings (Goetz, et al., 1983; Kaakinen et al., 2002; Kaakinen et al., 2003; Reynolds et al., 1993).

In contrast, according to the relevance specificity hypothesis, relevance instructions with greater specificity lead to faster reading times than less specific relevance instructions or control instructions. If the specificity of relevance instructions affects the development of the criteria for determining the relevance of text, then relevance instructions with greater specificity should lead to faster reading times because instructions with greater specificity are stated more explicitly. According to this view, relevance instructions with greater specificity lead to faster reading times because readers are able to focus on relevant information with greater efficiency. This hypothesis is consistent with previous findings (McCrudden et al., 2005; Rothkopf & Billington, 1979).

It is proposed that specific relevance instructions enable readers to identify and store relevant segments in memory without additional processing time. It was expected that the specificity of relevance instructions would affect reading time due to the nature of the relevance instructions. In previous research with general relevance instructions, readers were asked to read for a general purpose or goal that necessitated careful evaluation of potentially relevant segments. For example, Kaakinen et al. (2002) asked readers to read a passage about four different nations, focusing on segments that indicated why one of these nations was a better place to live than the others. These instructions are general and provide general criteria for distinguishing relevant text. In contrast, the manipulation in the present study informed readers about specific types of information that were relevant

before reading. This eliminated the need to carefully evaluate each potentially relevant segment as they were encountered, as was the case when reading under general relevance instructions. Thus, the text could be learned better without additional reading time because the text could be identified and stored in memory in a more conceptually driven manner.

According to this view, specificity of relevance instructions leads to differences in learning. Previous research indicates that both general instructions and specific pre-reading questions facilitate learning of relevant text. However, several studies have found that specific relevance instructions facilitated learning of text that is categorically related to relevant text (Lapan & Reynolds, 1994; McCrudden et al., 2005; Reynolds & Anderson, 1982; Reynolds, Standiford, & Anderson, 1979). For instance, McCrudden et al. (2005) demonstrated that pre-reading questions directed towards topic sentences facilitate learning of relevant and non-relevant text. It is possible that pre-reading questions directed towards topic sentences create an organizational framework that facilitates recall of supporting sentences. Therefore, according to the relevance specificity hypothesis, pre-reading questions directed towards topic sentences lead to greater gains in learning than general relevance instructions, with both exceeding performance by those in a control condition.

Predictions

It was predicted that specific relevance instructions would lead to the faster reading time than the general relevance instructions or the control instructions because more specific relevance instructions increases the ease with which a reader can identify and

store relevant text. It was further predicted that those in the control condition would have faster reading times than those in the general relevance condition. With no other instructions other than “read for understanding”, readers use importance as default criteria for establishing relevance (Schraw et al., 1993). Readers use prior knowledge of text structure to determine relevance when given basic instructions such as reading for understanding (Lorch & Lorch, 1996). In the present study, the topic sentences of the experimental text were rated significantly more important than supporting sentences in a pilot study. If those in the control use importance as the criteria for establishing relevance, those receiving specific instructions and those in the control will consider the topic sentences relevant. However, the relevance instructions for those in the specific condition contain constraints, whereas those in the control have a non-specific, content-free organizational framework. It was predicted that reading time for Morinthia topic sentences would increase when these sentences were not relevant because more time would be spent focusing on them.

Learning was measured with free recall and an essay. It was predicted that relevance instructions would facilitate free recall of more text content. In addition, it was predicted that those in the specific condition would recall more than those in the general condition. It was predicted that relevance instructions would facilitate the construction of within- and across-topic text relationships in the essay responses. In addition, it was predicted that those in the specific condition would generate more claims and have essays of better quality than those in the general condition. These predictions are based on the assumption that specific relevance instructions provide specific criteria for focusing on relevant text, facilitating the encoding of categorically related text.

Outcome Measures

These predictions were tested using a variety of outcome measures including reading time, free recall, a compare/contrast essay, and reader interest. First, reading times were used to measure on-line processing. Individuals read the text from a computer screen one sentence at a time as reading time was recorded. This was done to monitor reading times for each sentence. There is evidence that general pre-reading instructions increase reading time (Goetz et al., 1983; Reynolds et al., 1993; Kaakinen et al., 2002), whereas specific pre-reading questions decrease or have a minimal effect on reading time (McCrudden et al., 2005; Rothkopf & Billington, 1979). No studies have compared reading time for general and specific relevance instructions in the same experiment.

Second, the free recall asked readers to recall as much as they could about the text. This was included to measure the memory for text content. If relevance instructions facilitate encoding of more categorically similar text content, recall for text will be greater for conditions receiving relevance instructions.

Third, the essay was designed to measure across-topic text relationships that are formed by integrating text information. Across-topic relationships are established by relating a characteristic from one topic to a characteristic of another topic. For example, relating the economies of Morinthia and Culatta. If relevance instructions facilitate the construction of text relationships, then those receiving relevance instructions will generate more claims and have essays of better quality.

Lastly, the holistic interest questionnaire consisted of 10 items that asked participants to rate their interest in the text using a 5-point Likert-type scale. Responses to the interest questionnaire were summed to create a single post-reading holistic interest score. This

measure was included to determine whether relevance affected interest. It also served as a distracter task between reading and the learning measures.

Summary of the Present Study

This experiment was conducted to investigate the relevance non-specificity and relevance specificity hypotheses. The goal of the experiment was to examine whether the specificity of relevance instructions affects reading time and learning. Individuals read the *Morinthia & Culatta: Geography, Commerce and People* text one sentence at a time under one of three relevance conditions. Specific relevance instructions highlighted the relevance of topic sentences that described Morinthia. General relevance instructions asked readers to determine the good and bad sides of living in each country for an extended time. Control instructions asked participants to read for understanding. Reading time was recorded and free recall and an essay were used to measure learning.

CHAPTER 3

METHODOLOGY

Participants and Design

Sixty-three undergraduates from a large western university from an introductory educational psychology class participated in partial fulfillment of their class requirement. Participants were assigned randomly to one of three pre-reading relevance instruction groups: specific, general, or control. There were 21 participants in each condition. Participants in all three conditions received the following instructions prior to reading: “You will read a short passage about two countries: Morinthia and Culatta. We want you to read the passage carefully, remembering as much of the passage as possible. Later, you will be given a test to see how well you understood what you read.” This was the only pre-reading instruction given to those in the control (Appendix A).

The specific and general relevance conditions received additional instructions. The specific relevance condition received one question about each of the topic sentences for Morinthia (six questions total) and rated each question for interest using a 5-point Likert-type scale (1 = not at all interesting to 5 = very interesting). The specific relevance instructions were: “Prior to reading the passage, please read the 6 questions below and rate how interesting you find each question. We want you to focus on these questions as you read the passage.” An example of a question is, “How would you describe the

landscape of Morinthia?” Complete instructions appear in Appendix B. Those in the general relevance condition were given the goal of deciding whether one of the countries would be a good place to live for an extended time. Complete instructions appear in Appendix C.

At the bottom of the sheet containing relevance instructions was the statement, “Write ‘yes’ on the line to indicate that you understand these instructions” followed by a blank line. This was included to ensure that participants in all three conditions read and understood their respective instructions.

Materials

The text was a 1,200-word (approximately) informational narrative entitled *Morinthia & Culatta: Geography, Commerce, and People* that describes the attributes of two fictitious countries modified from materials developed by Lorch and Lorch (1985; see Appendix D). The text consisted of an introductory paragraph and 12 paragraphs describing six comparable categories of each of the two countries. The introductory paragraph presented a general discussion about travel to little-known countries but included no information about the text topic other than the names of the countries. The text was organized so that the six paragraphs about Morinthia were in the first half of the text and the six paragraphs about Culatta were in the second half of the text. The order of presentation of the categories was the same for each country. Each paragraph had a topic sentence followed by several supporting sentences. Each sentence contained only one idea unit. The experimental text (excluding the introductory paragraph) consisted of 117 sentences. The six paragraphs about Morinthia contained 60 sentences total: six topic

sentences (44 words) and 54 supporting sentences (505 words). The six paragraphs about Culatta contained 57 sentences total: six topic sentences (41 words) and 51 supporting sentences (496 words). The six pre-reading questions in the specific relevance condition referred directly to the six topic sentences about Morinthia.

The outcome measures included a post-reading holistic interest questionnaire, a recall test, compare/contrast essay, and choice short-answer item. The holistic interest questionnaire consisted of 10 items that asked participants to rate their interest in the passage using a 5-point Likert-type scale used by Lehman and Schraw (2002) (see Appendix E). Responses to the interest questionnaire were summed to create a single post-reading holistic interest score. Possible scores range from 10 to 50. For the recall test, participants were asked to recall as much of the passage as possible (see Appendix F). The compare and contrast essay question asked participants to compare and contrast the countries of Morinthia and Culatta (see Appendix G). The choice short-answer item asked participants to decide which country they would choose to live in and to provide at least two reasons for the choice (see Appendix H).

Procedure

Participants read and signed the informed consent form (see Appendix I). Participants were assigned randomly to one of the three experimental conditions and were read an overview of tasks. Text was presented on a computer screen one sentence at a time and reading times were recorded to the nearest millisecond. In the overview of tasks, participants were instructed to use the mouse to click the “start” icon and the first sentence of the passage would appear in the on-screen window. To advance to each

successive sentence, participants hit the “enter” key. The researcher indicated that participants should read at their normal rate, to click the enter key when ready to read the next sentence, and that they would not be able to look back at previously read sentences. The relevance instruction phase was completed before the *Morinthia and Culatta* passage was read. The pre-reading relevance instructions were read silently. Relevance instructions were available before reading only.

Once all participants completed their relevance instruction task, participants read the passage. Participants were given approximately 10 minutes to read the text. Once all participants finished reading, they opened the provided folders and completed each of the tasks separately (holistic interest questionnaire, recall, compare/contrast essay, and choice short-answer item) offline. First, they completed the 10-item holistic interest questionnaire. Next, they were given approximately 20 minutes to recall as much of the passage as possible. Then they were given approximately 15 minutes to answer the compare/contrast essay item. Lastly, they were given approximately 10 minutes to answer the choice short-answer item (Participants across sessions did not have comparable amount of time to complete the choice short-answer item. Only the country chosen was included in the data analyses.)

The researcher read aloud the instructions for each task before participants began a task. All participants completed each task before the researcher read instructions for the successive task. Participants did not have access to the text when tested. After all participants had completed the final task, they were debriefed and dismissed. The entire experiment was completed in approximately one hour.

Reading Time

Reading times were recorded to the nearest millisecond. The six topic sentences for Morinthia contained 44 words and the 54 supporting sentences contained 505 words. Culatta's six topic sentences contained 41 words and the 51 supporting sentences contained 496 words. To allow comparisons, reading time data was converted into separate ratios (reading time for sentence type divided by number of words in sentence type) for each type of sentence. Each participant had four separate reading time ratio scores, one each for Morinthia topic sentences, Morinthia supporting sentences, Culatta topic sentences, and Culatta's supporting sentences based on number of words per millisecond. This ratio was converted into reading time per word in seconds (e.g., reading time for Morinthia topic sentences / 44 / 1000). Reading time for the introductory paragraph was not included in the analyses.

Scoring of Recall

The author and another judge scored recall protocols anonymously. Segments in every recall protocol were evaluated to determine whether they matched a sentence in the original text. Recall was scored by tallying the combined total number of idea units that were recalled in either paraphrase or verbatim form from each of the 117 idea units of the text (the introductory paragraph was excluded from all recall analyses). A recalled segment was scored as a paraphrase if it captured the segment's gist meaning. Segments were scored as verbatim if they were recalled word-for-word or with very minor changes. When a segment was absent, incorrect, or too vague to be linked accurately to a segment in the original text, no score was assigned. The author scored all of the recall protocols.

A second judge scored a randomly selected subset (20%). There was 95% agreement on the author's assignment of recall scores, indicating high inter-rater reliability.

Category access referred to the number of categories for which at least one idea unit was recalled (Burns & Brown, 2000; Rawson & Kintsch, 2002). There were six categories corresponding to each paragraph of each country (geography, climate, economy, imports, population change, and government). Category access score per country ranged from 0 to 6. The number of statements recalled from a category was used to create the idea units per category score.

Scoring of Compare and Contrast Essay

The author and another judge scored the compare/contrast essays anonymously. Segments in the essays were evaluated for compare and contrast claims. A claim was a statement that explained a relationship between or among categories (e.g., economy) within or across topics (i.e., Morinthia or Culatta). For instance, "Morinthia's economy relies on tuna fishing partly because it has a long coastline." This would be a claim because it relates one category (economy) to another category (geography) within a topic (Morinthia). When a segment was incorrect or too vague for explaining a within- or across-topic relationship, no score was assigned. Tallying the number of claims contained in an essay created the essay claims score. The author scored all of the essays. The second judge scored a randomly selected subset (20%). There was 90% agreement on the assignment of claims, indicating high inter-rater reliability.

The compare/contrast essays were also assigned quality ratings using an interval scale: 3 (made inferences, provided compare and contrast claims); 2 (provided compare

and contrast claims); 1 (provided incomplete or partial claims); and 0 (did not provide claims or provided incorrect information). An inference was a statement that involved a unique integration of explicitly stated text segments or the integration of text with prior knowledge. For example, “Culatta could increase its exports if it would trade with Morinthia because Morinthia imports many of the products Culatta produces” would qualify as a unique integration of explicitly stated text. An incomplete claim was a statement that noted the characteristic of one country but did not relate it to a characteristic of the other country. For example, “Morinthia has a democratic government.” The second judge scored a randomly selected subset (20%). There was 88% agreement on the author’s assignment of quality ratings. Differences were discussed and resolved in conference.

Scoring of Short-Answer Item

Participants across data collection sessions did not have comparable amounts of time to complete the choice short-answer item. Therefore, only the country chosen was included in the data analyses.

CHAPTER 4

RESULTS

Reading Time

Reading time data were examined before the analyses to test for extreme scores. The data set was trimmed to eliminate scores greater than four standard deviations from the mean. Deleted scores were replaced with the group mean reading time per word for the specific sentence. These substitutions affected less than one percent of reading times. Analyses using this data did not change the results compared to untrimmed data. The Greenhouse-Geisser method was used to adjust for minor violations in the assumption of homogeneity of variance for some of the within-subjects effects. This resulted in fractional degrees of freedom in some cases.

Reading time data were analyzed using a 3 (type of pre-reading relevance instruction: specific, general, or control) X 2 (country: Morinthia or Culatta) X 2 (sentence type: topic or supporting) mixed model ANOVA on reading time per word. Type of relevance instruction was presented between-subjects; country and sentence type were repeated within-subjects. Reading times were recorded to the nearest millisecond. Reading time data for topic and supporting sentences were converted into separate ratios (seconds per word). Each participant had a separate reading time ratio score for Morinthia topic sentences, Morinthia supporting sentences, Culatta topic sentences, and Culatta

supporting sentences. The proportion was calculated with reading time per word, which means that a lower proportion is equated with faster reading time or less time spent reading each word. Means and standard deviations are shown in Table 1.

Table 1
Reading Time Proportion Means and Standard Deviations by Condition

Measure	Type of Pre-Reading Relevance Instructions					
	Specific		General		Control	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Morinthia						
Topic Sent.	.494	.122	.467	.151	.483	.104
Supporting Sent.	.413	.080	.401	.113	.399	.080
Culatta						
Topic Sent.	.439	.077	.445	.111	.42	.091
Supporting Sent.	.352	.058	.349	.079	.349	.071
Morinthia						
Geography	.544	.161	.512	.162	.514	.112
Climate	.449	.111	.431	.144	.43	.094
Economy	.382	.078	.375	.110	.387	.087
Imports	.397	.102	.393	.118	.387	.087
Population	.403	.084	.396	.109	.372	.106
Government	.384	.077	.375	.106	.374	.080
Culatta						
Geography	.430	.088	.468	.145	.441	.086
Climate	.346	.084	.357	.112	.349	.090
Economy	.363	.064	.357	.083	.355	.087
Imports	.364	.071	.361	.087	.376	.098
Population	.346	.055	.321	.068	.332	.083
Government	.333	.062	.324	.070	.325	.069

Note. Reading time data are in seconds per word.

There was no main effect for the type of relevance instruction variable, $F(1, 60) = .108, p = .10$, indicating that none of the three groups differed with respect to overall

reading time. In contrast, the repeated main effect for the country variable reached significance, $F(1, 60) = 33.07$, $MSE = .005$, $p < .001$. The mean proportion for reading time per word for Culatta sentences (.392) was significantly faster than the mean proportion for reading time per word for Morinthia sentences (.443). The effect size for repeated main effect for the country variable equaled .355 as measured by Eta squared. This exceeds the cutoff for a large effect size, using the guidelines proposed by Olejnik and Algina (2000) in which values of .01, .06, and .14 indicate small, medium, and large effect sizes when measured by Eta squared. Culatta sentences were read faster than the Morinthia sentences.

The repeated main effect for the sentence type variable reached significance, $F(1, 60) = 190.78$, $MSE = .002$, $p < .001$. The mean proportion for reading time per word for supporting sentences (.377) was significantly faster than the mean proportion for reading time per word for topic sentences (.458). The effect size for repeated main effect for the sentence type variable equaled .761 as measured by Eta squared. This exceeds the criterion for a large effect size. Supporting sentences were read faster than topic sentences. Reading time data show that the country variable and the sentence type variable affected reading time whereas relevance instruction did not.

Also, reading time data were analyzed for using a 3 (type of pre-reading relevance instruction: specific, general, or control) X 2 (country: Morinthia or Culatta) X 6 (category: geography, climate, industry, imports, population, and government) mixed model ANOVA on reading time per category. Type of relevance instruction was presented between-subjects; country and category were repeated within-subjects. There was no main effect for the type of relevance instruction variable, $F(1, 60) = .06$, $p > .10$,

indicating that none of the three groups differed with respect to overall reading time. In contrast, the repeated main effect for the country variable reached significance, $F(1, 60) = 80.24$, $MSE = .007$, $p < .001$. The mean proportion for reading time per word for the Culatta sentences (.364) was significantly faster than the mean proportion for reading time per word for the Morinthia sentences (.417). The effect size for repeated main effect for the sentence type variable equaled .572 as measured by Eta squared. This exceeds the criterion for a large effect size. Culatta sentences were read faster than the Morinthia sentences.

The repeated main effect for the category variable reached significance, $F(3.3, 197.89) = 94.36$, $MSE = .005$, $p < .001$. Post-hoc tests of marginal means using Tukey's Honestly Significant Difference (HSD) test revealed that the mean proportion for reading time for the geography category was significantly slower than each of the other categories (climate, economy, imports, population, and government). There were no other significant differences between categories. The effect size for repeated main effect for the category variable equaled .611 as measured by Eta squared. This exceeds the criterion for a large effect size. The only category that was read significantly slower than the other categories was the geography category. This was the first category presented for each of the countries, which may contribute to the increase in reading time for only that category relative to other categories.

The country X category interaction also reached significance, $F(3.58, 214.57) = 7.31$, $MSE = .004$, $p < .001$. The effect size for the interaction between the country and category variables equaled .109 as measured by Eta squared. This exceeds the criterion for a medium effect size. The country X category data is presented in Table 1 to illustrate

the trends in the data. The country X category interaction was due to the fact that the first two categories for Morinthia (geography & climate) and the first category for Culatta (geography) were read more slowly than other portions of the text whereas the other categories were read at about the same rate.

A post-hoc test of marginal means using Tukey's Honestly Significant Difference (HSD) revealed several significant differences. Reading time for the geography category (category 1) for Morinthia was significantly slower than reading time for all other categories for Morinthia and all of the categories for Culatta. There were no other significant differences between the categories within Morinthia. Reading time for the climate category (category 2) for Morinthia was slower than all of the categories for Culatta with the exception of the geography category (category 1). Reading time for the geography category (category 1) for Culatta was significantly slower than reading time for all other categories for Culatta and for the economy (3rd), imports (4th), population (5th), and government (6th) categories of Morinthia.

Recall

Recall data were analyzed for number of idea units using a 3 (type of pre-reading relevance instruction: specific, general, or control) X 2 (country: Morinthia or Culatta) X 2 (sentence type: topic or supporting) mixed model ANOVA. Type of relevance instruction was presented between-subjects; country and sentence type was repeated within-subjects. To allow comparisons, recall scores were converted to proportions. For example, if 15 idea units pertaining to Morinthia were recalled, the proportional recall score would be .25 (i.e., 15/60). Proportional means and standard deviations are shown

in Table 2. All tests of significance were made at the $p < .05$ level of significance unless otherwise noted. The Greenhouse-Geisser method was used to adjust for minor violations in the assumption of homogeneity of variance for some of the within-subjects effects. This resulted in fractional degrees of freedom in some cases.

Table 2
Recall Proportion Means and Standard Deviations by Condition

Measure	Type of Pre-Reading Relevance Instructions					
	Specific		General		Control	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Morinthia						
Topic Sent.	.230	.227	.246	.172	.151	.138
Supporting Sent.	.261	.092	.277	.105	.234	.091
Culatta						
Topic Sent.	.175	.193	.191	.132	.191	.169
Supporting Sent.	.221	.075	.242	.074	.206	.057
Morinthia						
Geography	.212	.153	.323	.175	.233	.161
Climate	.439	.155	.429	.190	.376	.177
Economy	.314	.153	.290	.191	.250	.132
Imports	.197	.172	.211	.190	.150	.178
Population	.125	.131	.137	.118	.179	.146
Government	.232	.139	.241	.131	.171	.113
Culatta						
Geography	.280	.153	.310	.161	.292	.160
Climate	.306	.198	.299	.234	.170	.133
Economy	.180	.103	.163	.118	.204	.099
Imports	.259	.215	.272	.202	.231	.189
Population	.163	.163	.243	.147	.153	.124
Government	.175	.091	.210	.097	.191	.121

Note. Recall data are proportions.

There was no main effect for the type of relevance instruction variable, $F(1, 60) = 1.14, p > .10$, indicating that none of the three groups differed with respect to overall recall of idea units. In contrast, the repeated main effect for the country variable reached significance, $F(1, 60) = 5.35, MSE = .01, p < .05$. Means and standard deviations are displayed in Table 2. The mean proportion for Morinthia idea units (.23) was significantly higher than the mean proportion for Culatta idea units (.20). The effect size for repeated main effect for the country variable equaled .082 as measured by Eta squared. This exceeds the criterion for a medium effect size. Morinthia idea units were recalled in greater proportion than Culatta idea units.

The repeated main effect for the sentence type variable reached significance, $F(1, 60) = 5.84, MSE = .02, p < .05$. The mean proportion for supporting sentence idea units (.24) were recalled significantly better than topic sentence idea units (.20). The effect size for repeated main effect for the sentence type variable equaled .089 as measured by Eta squared. This exceeds the criterion for a medium effect size. Supporting sentences were recalled more than topic sentences.

The recall protocols were analyzed for category access for Morinthia and category access for Culatta using a one-way (type of pre-reading relevance instruction: specific, general, or control) MANOVA. The maximum possible score for each country was six. Means and standard deviations are displayed in Table 3. There was no main effect for the type of relevance instruction variable, Wilks's lambda = .992, $F(4, 118) = .121, p > .10$, indicating that none of the three groups differed with respect to category access for Morinthia, $F(2, 60) = .175, p > .10$, nor Culatta, $F(2, 60) = .123, p > .10$.

Table 3
Category Access Means and Standard Deviations by Condition

Measure	Type of Pre-Reading Relevance Instructions					
	Specific		General		Control	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Category Access						
Morinthia	5.1	.87	5.2	.87	5.1	.63
Culatta	5.1	1.0	5.2	1.0	5.1	.80

Recall data were analyzed for idea units per category using a 3 (type of pre-reading relevance instruction: specific, general, or control) X 2 (country: Morinthia or Culatta) X 6 (category: geography, climate, industry, imports, population, and government) mixed model ANOVA. Type of relevance instruction was presented between-subjects; country and category were repeated within-subjects. There was no main effect for the type of relevance instruction variable, $F(1, 60) = 1.86, p > .10$, indicating that none of the three groups differed with respect to overall recall of idea units. Means and standard deviations are displayed in Table 2.

The repeated main effect for the country variable reached significance, $F(1, 60) = 4.36, MSE = .021, p < .05$. The mean proportion of idea units recalled for Morinthia (.25) was significantly higher than Culatta (.228). The effect size for repeated main effect for country equaled .068 as measured by Eta squared. This approximates the criterion for a medium effect size. Morinthia idea units were recalled in greater proportion than Culatta idea units.

The repeated main effect for the category variable reached significance, $F(4.19, 251.31) = 18.65$, $MSE = .028$, $p < .001$. Post-hoc tests of marginal means using Tukey's Honestly Significant Difference (HSD) test revealed that the mean proportion of idea units recalled from the climate category was significantly higher than the mean proportion of idea units recalled from the population category. There were no other significant differences between categories. The effect size for repeated main effect for the category variable equaled .237 as measured by Eta squared. This exceeds the criterion for a large effect size.

The country X category interaction also reached significance, $F(4.06, 243.57) = 14.02$, $MSE = .022$, $p < .001$. The effect size for the interaction between the country and category variables equaled .189 as measured by Eta squared. This exceeds the criterion for a large effect size. The country X category data is presented in Table 2 to illustrate trends in the data. The main contributing factor to the country X category interaction was the fact that the climate category for Morinthia was recalled in a significantly greater proportion than four of Morinthia's categories (geography, imports, population, and government) and all but one of Culatta's categories (climate, economy, imports, population, and government). No other pair-wise comparisons were statistically significant.

Compare and Contrast Essay

The compare/contrast essays were analyzed for number of claims and essay quality using a one-way (type of pre-reading relevance instruction: specific, general, or control) MANOVA. There was no main effect for the type of relevance instruction variable,

Wilks's lambda = .967, $F(4, 118) = .503, p > .10$, indicating that none of the three groups differed with respect to number of claims, $F(2, 60) = .912, p > .10$, nor essay quality, $F(2, 60) = .61, p > .10$, although trends were in the predicted direction. Means and standard deviations are shown in Table 4. Number of claims and essay quality did not differ as a function of relevance instructions.

Table 4
Essay Claims and Essay Quality Means and Standard Deviations by Condition

Measure	Type of Pre-Reading Relevance Instructions					
	Specific		General		Control	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Number of Claims	5.1	.87	5.2	.87	5.1	.63
Essay Quality	5.1	1.0	5.2	1.0	5.1	.80

Choice Item

The choice item asked participants to choose which country they would prefer to reside. Participants across data collection sessions did not have comparable amounts of time to complete the choice short-answer item. Therefore, only the country chosen was examined. Participants overwhelmingly chose to live in Morinthia. Of the 63 participants, 52 (82.5%) chose Morinthia and 11 (17.5%) chose Culatta. For those in the specific condition, 20 (95%) chose Morinthia and 1 (5%) chose Culatta. For those in the general condition, 16 (76%) chose Morinthia and 5 (24%) chose Culatta. For those in the control condition, 16 (76%) chose Morinthia and 5 (24%) chose Culatta.

Interest

A one-way ANOVA was performed using relevance instructions (specific, general, or control) as the independent variable and post-reading holistic interest score as the dependent variable. There were no statistically significant differences across the three experimental conditions on the post-reading holistic interest score, $F(2, 60) = 1.33, p > .10$. Means and standard deviations for the interest scores by condition were as follows: specific ($M = 23.4, SD = 9.2$), general ($M = 27.2, SD = 7.2$), and control ($M = 24.3, SD = 7.9$). Post-reading holistic interest did not differ as a function of relevance instruction.

Correlations

Correlations among dependent measures showed that all four measures of reading time were correlated positively with each other but with no other dependent measures (see Table 5 on pg. 68). Proportional recall of Morinthia topic sentences was correlated positively with recall of Morinthia supporting sentences and Culatta topic sentences as well as number of essay claims and essay quality. Proportional recall of Culatta topic sentences was correlated positively with Morinthia topic sentences and Morinthia supporting sentences as well as number of essay claims and essay quality. Proportional recall of Morinthia supporting sentences was correlated positively with Morinthia topic sentences, Culatta topic sentences, and Culatta supporting sentences as well as number of essay claims and essay quality. Proportional recall of Culatta supporting sentences was correlated positively with Morinthia supporting sentences as well as number of essay claims and essay quality. Number of essay claims was correlated positively with Morinthia topic sentences and Culatta topic sentences and Morinthia supporting

sentences and Culatta supporting sentences as well as essay quality. Essay quality was correlated positively with Morinthia topic sentences and Culatta topic sentences and Morinthia supporting sentences and Culatta supporting sentences as well as number of essay claims. Interest was not correlated with any of the dependent measures.

Summary of Findings

Findings did not support the predictions that the specificity of pre-reading relevance instruction affects reading time and learning. The relevance instruction variable did not produce any main effects or interactions for reading time or any of the learning measures. Although no significant differences in learning were reported, those receiving relevance instructions had higher scores than those in the control for all of the learning outcomes. The country and sentence type variables affected reading time and recall. The sentences for Culatta were read significantly faster than the Morinthia sentences. The supporting sentences were read significantly faster than the topic sentences. Morinthia idea units were recalled in greater proportion than Culatta idea units. Supporting sentences were recalled in greater proportion than topic sentences.

Certain categories of information were recalled in greater proportions than other categories. The country X category variable interaction showed that certain categories of information were recalled differently depending on the country variable. Overall, the results support neither of the proposed hypotheses. Both hypotheses were based on the well-founded assumption that relevance instructions lead to differences in learning. No differences in learning occurred, raising the question as to why there were no differences in learning.

Table 5
Correlations among Dependent Variables

	Morinthia TS RT	Culatta TS RT	Morinthia SS RT	Culatta SS RT	Morinthia TS Recall	Culatta TS Recall	Morinthia SS Recall	Culatta SS Recall	Essay Claims	Essay Quality	Interest
Morinthia TS RT	—										
Culatta TS RT	.520**	—									
Morinthia SS RT	.808**	.742**	—								
Culatta SS RT	.644**	.782**	.873**	—							
Morinthia TS Recall	-.061	-.079	-.180	-.204	—						
Culatta TS Recall	-.166	-.188	-.190	-.194	.462**	—					
Morinthia SS Recall	.119	.008	.093	.033	.305*	.314*	—				
Culatta SS Recall	-.175	-.051	-.156	-.108	.234	.233	.498**	—			
Essay Claims	-.184	.037	-.173	-.090	.260*	.409**	.372**	.505**	—		
Essay Quality	-.226	.072	-.123	.019	.249*	.371**	.331**	.442**	.650**	—	
Interest	.070	.108	.121	.173	-.226	-.074	-.023	.012	-.125	-.034	—

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Note. TS = Topic Sentence; SS = Supporting Sentence; RT = Reading Time

CHAPTER 5

DISCUSSION

The purpose of the present study was to examine whether the specificity of relevance instructions affects reading time and learning. There were two main research questions. The first question was whether the specificity of pre-reading relevance instructions promotes learning of relevant segments by increasing reading time or through more efficient use of mental resources. Pre-reading relevance instructions have produced inconsistent reading time patterns. The specificity of pre-reading relevance instructions may contribute to these inconsistent patterns. General pre-reading relevance instructions increase reading time for relevant segments (Goetz et al., 1983; Kaakinen et al., 2002; Kaakinen et al., 2003). Specific pre-reading instructions have led to longer, shorter, and no differences in reading time for relevant text (McCrudden et al., 2005, Rothkopf & Billington, 1979). The present study investigated whether the specificity of pre-reading relevance instructions contributes to inconsistent empirical results in reading time.

The second question was whether the specificity of pre-reading relevance instructions affects learning differently. Both general and specific pre-reading questions facilitate learning of relevant segments and inhibit learning of non-relevant segments. However, results from McCrudden et al. (2005) demonstrate that the nature of the information targeted by specific pre-reading questions can produce a general facilitative effect on

learning. It is possible that pre-reading questions directed towards topic sentences produce a facilitative effect on the learning of both relevant and non-relevant text.

To the author's knowledge, no studies have compared reading time and learning for specific and general relevance instructions, as defined in the literature review, in the same experiment. The present study investigated whether the specificity of pre-reading relevance instructions contributed to inconsistent empirical results in reading time. Learning was measured with recall and an essay item that assessed within- and across-topic text relationships.

Two competing hypotheses were compared. According to the relevance non-specificity hypothesis, specific and general relevance instructions do not produce differences in reading time, yet both lead to slower reading times than control instructions. According to this view, relevance instructions increase reading time because additional time is spent evaluating whether a segment is relevant. The effort intensive-process of evaluating segments as relevant is the presumed mechanism that increases learning. This hypothesis is consistent with previous findings (Goetz, et al., 1983; Kaakinen et al., 2002; Kaakinen et al., 2003; Reynolds et al., 1993).

In contrast, according to the relevance specificity hypothesis, relevance instructions with greater specificity lead to faster reading times than less specific relevance instructions or control instructions. According to this view, relevance instructions with greater specificity lead to faster reading times because readers are able to focus on relevant information with greater efficiency. This hypothesis is consistent with previous findings (McCrudden et al., 2005; Rothkopf & Billington, 1979).

These hypotheses were tested using a variety of outcome measures including sentence reading time, free recall, short-answer items, and reader interest. It was predicted that those receiving specific pre-reading relevance questions would read the text faster and learn more than those receiving general pre-reading instructions or those in a control.

Review of Results

The main results from the study can be summarized as follows: Relevance instructions showed no effects on any of the outcome variables. Morinthia sentences were read slower and recalled in greater proportion than Culatta sentences, indicating that readers spent more time reading Morinthia sentences and recalled a greater proportion of Morinthia sentences. Topic sentences were read slower and recalled in lesser proportion than supporting sentences, indicating that readers spent more time reading topic sentences yet recalled a greater proportion of supporting sentences. Differences in reading time and recall were associated with a shift in country and category such that reading times decreased as readers progressed from the Morinthia portion to the Culatta portion of the text, and reading times tended to decrease as readers progressed through each successive topic.

Results supported neither of the hypotheses. Both hypotheses were based on a long history of empirical evidence that has shown that relevance instructions affect reading time and facilitate learning. This raises the issue as to why no differences were found. Reading time data is discussed first, followed by learning data.

Reading Time

Two analyses were conducted on reading time. Both analyses included type of relevance instruction as the between-subjects factor and country as the repeated within-subjects factor. The two analyses differed in that the first analysis included sentence type (topic vs. supporting) as a repeated within-subjects factor whereas the second analysis included category as a repeated within-subjects factor.

In both analyses, there was no main effect for the type of relevance instruction variable, indicating that none of the three groups differed with respect to overall reading time. Both analyses showed a repeated main effect for the country variable. Culatta sentences were read faster than Morinthia sentences. The repeated main effect for country is likely due to a reading acclimation effect. That is, reading rate becomes faster as a reader progresses through a text. This replicates Reynolds and Anderson (1982), who found that reading time decreased for the second half of a text.

In the first analysis, there was a repeated main effect for sentence type, indicating that supporting sentences were read faster than topic sentences. In the second analysis, there was a repeated main effect for category. The main effect for category was due to the fact that the geography category was read significantly more slowly than each of the other categories. This was the first category presented for each of the countries, which may contribute to the increase in reading time for only that category relative to other categories. Also there was an interaction between country and category. The country X category interaction was due to the fact that the first two categories for Morinthia (geography & climate) and the first category for Culatta (geography) were read more

slowly than other portions of the text whereas the other categories were read at about the same rate.

Recall

Three analyses were conducted on recall. All three analyses included type of relevance instruction as the between-subjects factor and country as the repeated within-subjects factor. The three analyses differed in that the first analysis included sentence type (topic vs. supporting) as a repeated within-subjects factor whereas the second and third analyses included category as a repeated within-subjects factor.

In the first two analyses, there was no main effect for the type of relevance instruction variable, indicating that none of the three groups differed with respect to overall recall. However, those in the experimental conditions had higher proportional recall than those in the control. Although these differences were not statistically significant, they are in the direction predicted by the relevance effect. Both analyses showed a repeated main effect for the country variable. Morinthia sentences were recalled proportionally more than Culatta sentences. The repeated main effect for country is possibly due to an ordering effect. Ordering refers to the order of presentation of text segments. Readers often assume that the order of appearance of text segments is related to the importance of those text segments (Kintsch, 1998). Information that is more important or that is necessary to understand text segments occurring later is typically included towards the beginning of a text. Another possibility is that pre-reading relevance instructions have a generalized effect on recall of relevant text segments.

The repeated main effect for the sentence type variable indicated that supporting sentences were recalled proportionally more than topic sentences. This finding is somewhat perplexing considering that topic sentences were read more slowly than supporting sentences.

The repeated main effect for the category variable revealed that the mean proportion of idea units recalled from the climate category was significantly higher than the mean proportion of idea units recalled from the population category. There were no other significant differences between categories. The country X category interaction also reached significance. The main contributing factor to the country X category interaction was the fact that the climate category for Morinthia was recalled in a significantly greater proportion than all but one of Morinthia's (economy) and Culatta's (geography) categories. No other pair-wise comparisons were statistically significant. These results could be due to any number of factors including familiarity with climate information or the idiosyncratic nature of the text.

The third analysis measured category access. Category access referred to the number of categories or characteristics for which at least one idea unit was recalled. There were no significant main effects or interactions, indicating no differences in category access. This result is consistent with Lawson and Kintsch (2002), who found no differences in category access between conditions that did or did not receive background information prior to reading. However, Lawson and Kintsch (2002) did find differences in free recall, which did not occur in the present study.

Essay

There were no differences between conditions with respect to the number of claims included in the essay response nor in the essay quality ratings. However, those in the experimental conditions did include a greater number of claims and had higher essay quality ratings than those in the control. Although these differences were not statistically significant, they are in the direction predicted by the relevance effect. Considering there were no differences in reading time or recall as a result of relevance instruction, this finding is consistent with the other data in the present study.

Interest

There were no statistically significant differences in holistic interest as a result of relevance instruction, suggesting that interest did not affect reading time or recall.

Explanation of Results

There are several potential explanations why relevance did not affect reading time. One is that the treatment was too brief. This is unlikely considering much of the research on pre-reading relevance instructions involve brief manipulations of relevance instruction as in the present study. Studies with treatments comparable to the present study frequently have reported significant treatment effects (Baillet & Keenan, 1986; Goetz et al., 1983; Kaakinen et al., 2002; Kaakinen et al., 2003).

A second potential explanation is that the text was too short and well written. A short, well-written text is not particularly challenging for proficient readers such as college students to comprehend. However, the likelihood of this explanation is low

considering the results of McCrudden et al. (2005). McCrudden et al. used the Morinthia portion of the text from the present study and found that topic sentence pre-reading questions facilitated recall of both relevant and non-relevant text as compared to supporting sentence pre-reading questions and control instructions. Those receiving topic sentence instructions had faster reading times for both relevant and non-relevant sentences compared to those in the supporting sentence and the control conditions.

A third possibility is that the Culatta portion of the text interfered with recall for Morinthia segments for those in the specific condition. Those in the specific pre-reading condition considered questions about Morinthia. The same topics were repeated for Culatta. It is possible that the similarity of the topics between the countries interfered with accessibility of idea units from memory.

A fourth possibility is that the text's topic structure affected processing. The topic structure of an expository text includes topic sentences, supporting sentences, and their interrelations (Lorch & Lorch, 1985). Three pieces of evidence from the reading time data support the notion that readers across conditions were sensitive to the text's topic structure in the present study. First, topic sentences were read more slowly than supporting sentences, replicating the findings of Lorch, Lorch, and Matthews (1985). Second, the country X category interaction was mainly due to the increase in reading time associated with the first paragraph of each country. This indicates that the transition from one main topic to the next required additional processing time. Third, despite the repeated main effect for the country variable (Culatta sentences were read faster than Morinthia sentences), supporting sentences were read proportionally faster across both

countries. Based on the interpretation of the reading time data, it is plausible to conclude that topic structure affected reading time, possibly diluting the relevance effect.

A fifth possibility is that there was variability in the research participant pool. With a relatively low number of participants ($n=63$), the effect of individual participants on the findings is potentially greater. This is a likely possibility considering McCrudden et al. (2005) used similar materials as the present study with participants from the same general participant pool (although no students participated in both studies). Furthermore, the reading time and recall patterns for those in the pre-reading questions condition differed from the those in the same condition in McCrudden et al. For instance, in the present study, reading time per word for Morinthia topic sentences was (.494) whereas in McCrudden et al. it was (.447). Proportional recall of topic sentences in the present study was (.230) as compared to (.341), and overall recall of Morinthia text in the present study was (.246) as compared to (.347).

Limitations of the Present Study

The present study was limited in several ways. First, by design, the text order was not counter-balanced. The Morinthia portion of the text was presented first, followed by the Culatta portion of the text for all participants. A second limitation, related to the first, is that there were no questions directed towards the topic sentences of Culatta. It was expected that pre-reading questions directed towards topic sentences for Morinthia would facilitate recall of Morinthia text and have a transfer effect, facilitating recall of Culatta text because the categories for both countries were similar, which did not occur. The text was not counter-balanced nor were there questions directed towards the topic sentences

of Culatta in the present study because the main variable under consideration was the specificity of pre-reading relevance instructions. These are variables to consider in future research.

A third limitation is that the experimental text was not very technical. The relevance manipulation in the present study may affect text processing differently when using a technical text, such as a text describing the steps in the formation of lightning.

Lastly, there was no measure of reader characteristics such as reading ability or working memory capacity. Previous research has demonstrated that reading ability and working memory capacity affect text processing by college readers. Reader characteristics were not included in the present study because of practical time limitations and the exploratory nature of the study.

Future Directions

The present study raises more questions than it answers, generating several possible directions for future research. Future research should investigate the effect of text order and use of different relevance manipulations. One possibility includes counter-balancing text order (Morinthia-Culatta vs. Culatta-Morinthia) and directing questions toward the topic sentences of Morinthia, Culatta, or both. This type of design would address whether the order of presentation affects text processing and how questions directed towards topic sentences affect text processing when text is presented in a different order. Having the conditions in which participants receive questions directed towards topic sentences may reveal that the number of questions or the disbursement of questions relevant to a greater proportion of the text may affect text processing.

Another possibility involves manipulating relevance instructions in a way that influences where readers ultimately choose to live. The vast majority of the participants choose to live in Morinthia. It would be interesting if the pre-reading instructions could be manipulated in a way that the majority of participants would choose Culatta. For instance, instructions could ask readers to read from the perspective of a rich oil tycoon. As oil exploration was taking place in Culatta, Culatta may be a more beneficial place to live. This may affect the processing of the Culatta text differently than in the present study.

Main Contribution of the Dissertation

The main contribution of this dissertation to research was the development of the relevance taxonomy. Several variables influence the extent to which text segments are related to a reader's goals. Relevance is clearly one of these variables as relevance instructions affect text learning. While this idea is not new, the notion of relevance as a distinct construct has not been articulated clearly in previous research. Relevance instructions can take many forms and can differentially affect how readers interact with text to create meaning. The taxonomy of relevance provides a unifying framework for conceptualizing the construct of relevance as it relates to text processing and a guide for future research for testing whether certain relevance manipulations affect text learning and the efficiency of cognitive processing.

APPENDIX A

Control Instructions

In this study, you will read a short passage on two countries: Morinthia and Culatta. We want you to read the passage carefully, remembering as much of the passage as possible. Later, you will be given a test to see how well you understood what you read.

❖ Write “yes” on the line to indicate that you understand these instructions: _____

APPENDIX B

Specific Relevance Instructions

In this study, you will read a short passage on two countries: Morinthia and Culatta. We want you to read the passage carefully, remembering as much of the passage as possible. Later, you will be given a test to see how well you understood what you read.

Prior to reading the passage, please read the 6 questions below and rate how interesting you find each question. We want you to focus on these questions as you read the passage. Use the scale shown below to rate how interesting you find each question. Please write a number in the blank next to each question.

Not at All Interesting	Not Interesting	Neutral	Somewhat Interesting	Very Interesting
1	2	3	4	5
<hr/>				
1. How would you describe the landscape of Morinthia?				
2. How would you describe the climate of Morinthia?				
3. What is Morinthia's economy based on?				
4. What must Morinthia do to maintain its economy?				
5. How has Morinthia's population changed?				
6. What form of government does Morinthia have?				

❖ Write "yes" on the line to indicate that you understand these instructions: _____

APPENDIX C

General Relevance Instructions

In this study, you will read a short passage on two countries: Morinthia and Culatta. We want you to read the passage carefully, remembering as much of the passage as possible. Later, you will be given a test to see how well you understood what you read.

Imagine you will be required to move in the near future to either Morinthia or Culatta. You have to decide which country you want to live in. Your stay in this country will last for several years and you will need to live in that country permanently for that time. As you read the following text, determine the good sides and bad sides to each country. We want you to keep this in mind as you read.

❖ Write “yes” on the line to indicate that you understand these instructions: _____

APPENDIX D

(The text read by participants did not include numbering. To assist readers of this research, the sentences for each respective country are numbered. Each sentence that begins a new paragraph is a topic sentence whereas each successive sentence in a paragraph is a supporting sentence. The introductory paragraph appears first but was not included in any of the analyses. This text has been adapted from the appendix of "Topic Structure Representation and Text Recall," by R. F. Lorch and E. P. Lorch, 1985, *Journal of Educational Psychology*, 77, pp.147-148. Copyright 1985 by the American Psychological Association.)

Morinthia & Culatta: Geography, Commerce, and People

Many of us are fascinated with world travel.

Visiting the countries of the world can be exciting.

Through travel, we can discover familiar countries and can also experience the excitement and wonder of exploring little-known nations.

Few of us can travel so broadly.

Although reading about other countries cannot compare with visiting them, it can be interesting.

By reading about other countries, we can at least vicariously explore new places.

In the following paragraphs, we will explore the countries of Morinthia and Culatta.

1. Morinthia is a country of great physical contrasts.
2. The geography of Morinthia is particularly rugged.
3. The country lies on the western coast of a large land mass.
4. Its coastline is long and boasts good natural harbors.
5. A large mountain range forms Morinthia's eastern border.
6. The great mountains rise gradually from the coast.
7. The tallest mountain stands over 15,000 feet.
8. Below the mountain, the capitol city huddles about a large harbor.
9. The harbor is deep and protected naturally from bad weather.
10. Morinthia's climate is very diverse.
11. The weather is tropical at sea level.
12. It is hot and humid eleven months of the year.
13. The twelfth month is the rainy season on the coast.
14. It is cold in the mountains of the country.
15. Snow caps the tallest mountains all year.
16. The mountainous terrain also means earthquakes are common.

17. A severe earthquake occurs every few years.
18. Severe lightning storms also are quite common.
19. Morinthia's economy is based on three major industries.
20. Fishing has always been important to Morinthia's economy.
21. Tuna fishing is the most important fishing industry today.
22. Whaling was once a major part of the fishing industry, but not any longer.
23. The mining industry plays an important role in Morinthia's economy.
24. Mining was developed by foreign investors and has been built in just the past 20 years.
25. The mountains are rich in copper and iron ore.
26. Other minerals may be found as prospecting continues.
27. The mountains are not only a source of minerals, however.
28. Coffee crops are grown in the mountains.
29. Although not as important as fishing or mining, coffee constitutes a significant part of the country's exports.
30. The country also produces some good wines.
31. Morinthia must import many products to maintain its economy.
32. Many agricultural products are imported to the country.
33. For example, most grains and vegetables are imported.
34. Dairy products are also purchased from some northern countries.
35. These products are in short supply because there is no land available for farming or grazing.
36. Petroleum and heavy machinery are imported as well.
37. These products are needed to support the mining industry.
38. Morinthia's population has changed due to economic growth.
39. The original inhabitants were fishermen.
40. Many of their descendants are still fisherman.
41. The prosperity of the fishing industry and economic opportunity brought many immigrants from poorer nations.
42. The development of the mining industry brought still more immigrants.
43. The population has tripled since the start of the mining industry.
44. Most immigrants adjust quite well to their new lives.
45. Most of Morinthia's population lives in the city.
46. Morinthia has a stable democratic government.
47. A century ago, the country had no central government.
48. Instead, villages were under local rule.
49. The government changed as the country developed.
50. As the fishing industry prospered and mining developed, the country became more urbanized and the need for a centralized government became apparent.
51. This is a common sequence of events in developing countries.
52. The current government has a simple organization.
53. An elected president heads the government for six years.

54. The president appoints twenty people to his cabinet.
55. These people are responsible for running various aspects of the country.
56. For example, they head the military, education, treasury, etc.
57. The government also has an elected senate.
58. The senators serve as legislative body for four years each.
59. The senate provides a system of checks on executive activities.
60. Half the senate is elected every two years.

61. Culatta is a country with very little physical contrast.
62. The geography of Culatta is particularly smooth.
63. Culatta is a land-locked country lying east of Morinthia.
64. Most of the country consists of flat plains.
65. A single major river runs east-west through the middle of the country.
66. The river originates from the west in the mountains of Morinthia
67. The river flows through both Culatta and its neighbor to the east on the way to the sea.
68. The land along the river is fertile.

69. Culatta's climate is very uninteresting.
70. The weather is mild throughout the country.
71. The plains are hot and dry most of the year.
72. The weather is generally uneventful except for an occasional thunderstorm.
73. The western border receives a lot of rain.
74. This is because Morinthia's mountains are near.
75. Culatta does not have the earthquakes that plague Morinthia.

76. Culatta's economy is based on agriculture.
77. Ranching has always been important to Culatta's economy.
78. There are many ranches in the country.
79. The plains of the country are ideal for grazing.
80. Cattle are raised throughout Culatta.
81. Beef is virtually the only export of the country.
82. Farming also plays an important role in Culatta's economy.
83. Most of the farms lie along the river, where the land is fertile.
84. There is also some farming in western Culatta near the mountains.
85. The farms raise mostly vegetable crops.
86. They raise enough crops to supply the country's needs, but no more.
87. Aside from agriculture, there is no industry to speak of.
88. There is, however, speculation that the country may have large oil deposits.
89. Exploration has begun only recently.

90. Culatta's economy is relatively self-sufficient.
91. That is a rare occurrence in today's world.
92. Culatta can supply most of its own food.
93. And without much industry, the country does not have the needs of more complex economies.

94. Most of Culatta's imports are luxury items.
95. For example, the country imports some cars and appliances.
96. Rich landowners import these products.
97. Culatta's population has changed very little over time.
98. Most of the people of Culatta are natives.
99. They are descendants of a rich indigenous culture.
100. The culture died mysteriously five hundred years ago.
101. The people of today are poor, but hard-working.
102. Besides ranching and farming, there are few other occupations among the people of Culatta.
103. The wealth of the country belongs to the large landowners.
104. Most of the population of Culatta lives near the river.
105. The plains of the country are sparsely populated.
106. Culatta's government is run by a weak dictatorship.
107. The dictator is controlled by the rich landowners.
108. The landowners promote their interests in cattle.
109. There is really no need for a strong centralized government in the country given its agrarian economy.
110. The government may be due for some changes in the future, however.
111. Political turmoil will probably result if oil is discovered in Culatta.
112. It will be averted only if the ranchers gain control of the oil industry that develops.
113. The growth of an oil industry will bring about many changes that will necessitate a strong government.
114. Many foreign investors and workers will come into Culatta.
115. They will introduce cultural and economic changes.
116. The growth of industry will complicate the economy; cities will develop and bring new problems.
117. Only a strong government will be able to cope with the changes.

APPENDIX E

Interest Questionnaire

In this part we want you to rate how you responded to the passage overall. Please indicate how strongly you agree or disagree with each statement using the 5-point scale shown below.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5
1. I thought the story was very interesting.	1	2	3	4	5
2. I'd like to discuss this story with others at some point.	1	2	3	4	5
3. I would read this story again if I had the chance.	1	2	3	4	5
4. I got caught-up in the story without trying to.	1	2	3	4	5
5. I'll probably think about the implications of this story for some time to come.	1	2	3	4	5
6. I thought the story's topic was fascinating.	1	2	3	4	5
7. The story was personally relevant to me.	1	2	3	4	5
8. I would like to read more about this topic in the future.	1	2	3	4	5
9. The story was one of the most interesting things I've read in a long time.	1	2	3	4	5
10. The story really grabbed my attention.	1	2	3	4	5

APPENDIX F

Recall Instructions

We would like you to recall as much as you can about the passage you just read entitled *Morinthia and Culatta*. Don't worry about spelling or punctuation. Try to remember as much as you can. If you only remember some of the meaning from a sentence, include that too. You will have approximately 20 minutes to write down as much as you can. If you finish before others, please wait quietly until everyone is finished. Use the back if necessary.

APPENDIX G

Compare/Contrast Essay

The *Morinthia & Culatta* passage described several characteristics of the two countries. Please compare and contrast the countries of Morinthia and Culatta in an essay. Please respond as thoroughly as possible and use as much detail as you can. Consider the characteristics of each of the countries in your response. Don't worry about spelling or punctuation.

APPENDIX H

Choice Item

Imagine you will be required to move in the near future to either Morinthia or Culatta. You have to decide which country you want to live in. Your stay in this country will last for several years and you will need to live in that country permanently for that time.

Which country would you choose to live in? (circle one) Morinthia Culatta

In the space below, please provide two or more reasons for your choice:

APPENDIX I

Informed Consent Form

TITLE OF STUDY: The Effect of Specificity of Relevance Instructions on Reading Time and Learning

INVESTIGATORS: McCrudden, Matthew; Schraw, Gregory

PROTOCOL NUMBER: OPRS# 0312 - 1063

Purpose of the Study

You are invited to participate in a research study. The purpose of this study is to see how specific and general pre-reading instructions affect how people learn when they read.

Participants

You are being asked to participate in the study because you have a great deal of reading experience. You can help researchers understand how people learn when they read.

Procedures

If you choose to participate in this study, you will be asked to do several tasks. You will be asked to read a 1,177-word text on two fictitious countries. Then you will rate the passage for interest and be given a test of what you learned. After everyone has finished, the researcher will explain the expected results of this study. The entire session should take approximately 1 hour to complete.

Benefits of Participation

Benefits include an opportunity to earn course credit for participation and to learn about recent research on relevance instructions. The research can provide information about use of pre-reading relevance instructions on learning and reading time. This information can influence the use of pre-reading instructions in text and the instructors' use of pre-reading instructions.

Risks of Participation

The risks associated with this research are minimal. A possible risk is anxiety normally associated with test-taking.

Cost/Compensation

There will be no financial cost to you for participation in this study. The costs associated with this research are minimal. The only foreseeable cost is the use of your time. The study will take 1 hour of your time. You will not be compensated for this time. The University of Nevada, Las Vegas may not provide compensation or free medical care for an unanticipated injury sustained as a result of participating in this research study.

Contact Information

If you have questions or concerns about the study you may contact me at 895-3253. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact the UNLV Office for the Protection of Research Subjects at 895-2794.

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the University of Nevada-Las Vegas. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link individual students to this study. All records will be stored in a locked facility at UNLV for at least 3 years after completion of the study and will then be destroyed.

Participant Consent

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

Signature of Participant

Date

Participant Name (Please Print)

APPENDIX J

The Effect of Specificity of Relevance Instructions on Reading Time and Learning

Matthew T. McCrudden, Gregory Schraw
Department of Educational Psychology

Subjects

Participants used in the study will be selected from the undergraduate educational psychology research pool. These individuals receive course credit for their participation.

Purpose

Skilled readers establish goals and purposes for reading that influence what they understand and remember about a text. Establishing goals and purposes may improve understanding because they heighten the relevance of targeted text segments. McCrudden, Schraw, and Kambe (2005) examined the effect of specific pre-reading questions directed towards either topic sentences or supporting sentences on recall and reading time. Preliminary results indicate that pre-reading questions directed towards topic sentences facilitate recall of both relevant and non-relevant text compared to the condition receiving pre-reading questions directed towards supporting sentences and the control condition. Even more interesting, the topic sentence condition had faster reading times for both relevant and non-relevant sentences compared to the supporting sentence condition and the control condition. These results differ from previous research that show increases in learning for relevant sentences only and longer reading times for relevant text (Goetz, Schallert, Reynolds, & Radin, 1983; Kaakinen, Hyona, and Keenan, 2002). These differences may be due to the level of specificity of pre-reading relevance instructions. The purpose of the present research will be to investigate the effects of specific vs. general pre-reading relevance instruction on reading time and learning.

Methods and Procedures

All participants will read the same 1,177 word expository text entitled "Morinthia & Culatta: Geography, Commerce and People." Participants will be assigned randomly to one of three relevance instruction conditions: control, general, or specific. All three conditions will receive the following instructions prior to reading: "You will read a short passage about two countries: Morinthia and Culatta. We want you to read the passage carefully, remembering as much of the passage as possible. Later, you will be given a test to see how well you understood what you read." The general relevance condition and

the specific relevance condition will receive additional instructions. The general relevance condition will be asked to determine the good and bad sides of living in each country. The specific relevance condition will be asked specific questions about the topic sentences for Morinthia.

Procedures in both groups will be identical thereafter. Participants will be given 15 minutes to read the story. Next, they will be given a 10-item interest questionnaire to complete. Later, they will be given 20 minutes to recall as much of the story as possible. After this, they will be given 10 minutes to respond to an essay question.

Risks

The risks associated with this research are minimal. A possible risk is anxiety normally associated with test-taking.

Benefits

Benefits include an opportunity to earn course credit for participation and to learn about recent research on relevance instructions. The research can provide information about use of pre-reading relevance instructions on learning and reading time. This information can influence the use of pre-reading instructions in text and the instructors' use of pre-reading instructions.

Risk-Benefit Ratio

The benefits of this research outweigh the risks. Benefits include an opportunity to earn course credit for participation and to learn about recent research on relevance instructions. The research can provide information about use of pre-reading relevance instructions on learning and reading time. This information can influence the use of pre-reading instructions in text and the instructors' use of pre-reading instructions. Risks are minimal. The only foreseeable risk is use of participants' time.

Costs to Subjects

There will be no financial cost for participation in this study. The costs associated with this research are minimal. The only foreseeable cost is the use of participants' time.

Informed Consent

All participants are expected to be legal adults (18 or older). In addition, each will be informed as to the nature of the study prior to participating and have the right to withdraw at any time without penalty. Participants will read and sign the informed consent form prior to the start of the study. The researchers will be responsible for obtaining the informed consent. The informed consent forms will be stored in a locked facility at UNLV for at least 3 years after the completion of the study.

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link specific individuals to this study. All records will be stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time, the information gathered will be destroyed.

REFERENCES

- Baillet, S. D., & Keenan, J. M. (2000). The role of encoding and retrieval processes in the recall of text. *Discourse Processes*, 9, 247-268.
- Burns, D. J., & Brown, C. A. (2000). The category access measure of relational processing. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 26, 1057-1062.
- Chi, M. T. H., De Leeuw, N., Chiu, M., & Lavancher, C. (1994). Eliciting self-explanations improves understanding. *Cognitive Science*, 18, 439-477.
- Di Vesta, F. J., & Di Cintio, M. J. (1997). Interactive effects of working memory span and text context on reading comprehension and retrieval. *Learning & Individual Differences*, 9, 215-231.
- Duchastel, P. C., & Brown, P. F. (1974). Incidental and relevant learning with instructional objectives. *Journal of Educational Psychology*, 66, 481-485.
- Duell, O. K. (1974). Effect of type of objective, level of test questions, and the judged importance of tested materials upon posttest performance. *Journal of Educational Psychology*, 66, 225-232.
- Frase, L. T., & Kreitzberg, V. S. (1975). Effect of topical and indirect learning directions on prose recall. *Journal of Educational Psychology*, 67, 320-324.
- Gagne, E. D., & Rothkopf, E. Z. (1975). Text organization and learning goals. *Journal of Educational Psychology*, 67, 445-450.
- Goetz, E. T., Schallert, D. L., Reynolds, R. E., and Radin, D. I. (1983). Reading in perspective: What real cops and pretend burglars look for in a story. *Journal of Educational Psychology*, 75, 500-510.
- Graesser, A. C., & Bertus, E. L. (1998). The construction of causal inferences while reading expository texts on science and technology. *Scientific Studies of Reading*, 2, 247-269.
- Guthrie, J. T. (1988). Locating information in documents: Examination of a cognitive model. *Reading Research Quarterly*, 23, 178-199.

- Guthrie, J. T., & Mosenthal, P. (1987). Literacy as multidimensional: Locating information and reading comprehension. *Educational Psychologist*, 22, 279-297.
- Kaakinen, J. K., Hyona, J., & Keenan, J. M. (2002). Perspective effects on online text processing. *Discourse Processes*, 33, 159-173.
- Kaakinen, J. K., Hyona, J., & Keenan, J. M. (2003). How prior knowledge, WMC, and relevance of information affect eye fixations in expository text. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 29, 447-457.
- Kahneman, D. (1973). *Attention and Effort*. Englewood Cliffs, NJ: Prentice-Hall.
- Kaplan, R. (1974). Effects of learning prose with part versus whole presentations of instructional objectives. *Journal of Educational Psychology*, 66, 787-792.
- Kaplan, R., & Rothkopf, E. Z. (1974). Instructional objectives as directions to learners: Effect of passage length and amount of objective-relevant content. *Journal of Educational Psychology*, 66, 448-456.
- Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. Cambridge, UK: Cambridge University Press.
- Kirsch, I. S., & Guthrie, J. T. (1984). Prose comprehension and text search as a function of reading volume. *Reading Research Quarterly*, 19, 331-342.
- Lapan, R., & Reynolds, R. E. (1994). The selective attention strategy as a time-dependent phenomenon. *Contemporary Educational Psychology*, 19, 379-398.
- Lehman, S., & Schraw, G. (2002). Effects of coherence and relevance on shallow and deep text processing. *Journal of Educational Psychology*, 94, 738-750.
- Linderholm, T., & van den Broek, P. (2002). The effects of reading purpose and working memory capacity on the processing of expository text. *Journal of Educational Psychology*, 94, 778-784.
- Lorch, R. F., & Lorch, E. P. (1985). Topic structure representation and text recall. *Journal of Educational Psychology*, 77, 137-148.
- Lorch, R. F., & Lorch, E. P. (1996). Effects of organizational signals on free recall of expository text. *Journal of Educational Psychology*, 88, 38-48.
- McCrudden, M. T., Schraw, G., & Kambe, G. (2005). The effect of relevance instructions on reading time and learning. *Journal of Educational Psychology*, 97, 88-102.

- Meyers, J., & O'Brien, E. (1998). Accessing the discourse representation during reading. *Discourse Processes*, 26, 131-157.
- Narvaez, D., van den Broek, P., & Ruiz, A. B. (1999). The influence of reading purpose on inference generation and comprehension in reading. *Journal of Educational Psychology*, 91, 488-496.
- O'Brien, E., Albrecht, J., Rizzella, M., & Halleran, J. (1998). Updating a situation model: A memory-based text processing view. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 24, 1200-1210.
- Olejnik, S., & Algina, J. (2000). Measures of effect size for comparative studies: Applications, interpretations, and limitations. *Contemporary Educational Psychology*, 25, 241-286.
- Peeck, J. (1970). Effect of prequestions on delayed retention of prose material. *Journal of Educational Psychology*, 61, 241-246.
- Pichert, J. W., & Anderson, R. C. (1977). Taking different perspectives on a story. *Journal of Educational Psychology*, 69, 309-315.
- Pressley, M., McDaniel, M. A., Turnure, J. E., Wood, E., & Ahmad, M. (1987). Generation and precision of elaboration: Effects on intentional and incidental learning. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 13, 291-300.
- Pressley, M., Symons, S., McDaniel, M. A., Snyder, B. L., & Turnure, J. E. (1988). Elaborative interrogation facilitates acquisition of confusing facts. *Journal of Educational Psychology*, 80, 268-278.
- Pressley, M., Wood, E., Woloshyn, V., Martin, V., King, A. & Menke, D. (1992). Encouraging mindful use of prior knowledge: Attempting to construct explanatory answers facilitates learning. *Educational Psychologist*, 27, 91-109.
- Rawson, K. A., & Kintsch, W. (2002). How does background information improve memory for text content? *Memory & Cognition*, 30, 768-778.
- Reynolds, R. E. (1992). Selective attention and prose learning: Theoretical and empirical research. *Educational Psychology Review*, 4, 345-391.
- Reynolds, R. E., & Anderson, R. C. (1982). Influence of questions on the allocation of attention during reading. *Journal of Educational Psychology*, 74, 623-632.
- Reynolds, R. E., Standiford, S. N., & Anderson, R. C. (1979). Distribution of reading time when questions are asked about a restricted category of text information. *Journal of Educational Psychology*, 71, 183-190.

- Reynolds, R. E., Trathen, W., Sawyer, M. L., & Shepard, C. R. (1993). Causal and epiphenomenal use of the selective attention strategy in prose comprehension. *Contemporary Educational Psychology, 18*, 258-278.
- Rickards, J. P., & Di Vesta, F. J. (1974). Type and frequency of questions in processing textual material. *Journal of Educational Psychology, 66*, 354-362.
- Rothkopf, E. Z., & Billington, M. J. (1974). Indirect review and priming through questions. *Journal of Educational Psychology, 66*, 669-679.
- Rothkopf, E. Z., & Billington, M. J. (1975a). Two-factor model of the effect of goal-descriptive directions on learning from text. *Journal of Educational Psychology, 67*, 692-704.
- Rothkopf, E. Z., & Billington, M. J. (1975b). Relevance and similarity of text elements to descriptions of learning goals. *Journal of Educational Psychology, 67*, 745-750.
- Rothkopf, E. Z., & Billington, M. J. (1979). Goal-guided learning from text: Inferring a descriptive processing model from inspection times and eye movements. *Journal of Educational Psychology, 71*, 310-327.
- Rothkopf, E. Z., & Kaplan, R. (1972). Exploration of the effect of density and specificity of instructional objectives on learning from text. *Journal of Educational Psychology, 63*, 295-302.
- Rothkopf, E. Z., & Koether, M. E. (1978). Instructional effects of discrepancies in content and organization between study goals and information sources. *Journal of Educational Psychology, 70*, 67-71.
- Schraw, G., & Dennison, R. (1994). The effect of reader purpose on interest and recall. *Journal of Reading Behavior, 26*, 1-18.
- Schraw, G., Wade, S. E., & Kardash, C. A. (1993). Interactive effects of text-based and task-based importance on learning from text. *Journal of Educational Psychology, 85*, 652-661.
- Shavelson, R. J., Berliner, D. C., Ravitch, M. M., & Loeding, D. (1974). Effects of position and type of question on learning from prose material: Interaction of treatments with individual differences. *Journal of Educational Psychology, 66*, 40-48.
- Swenson, I., & Kulhavy, R. W. (1974). Adjunct questions and the comprehension of prose by children. *Journal of Educational Psychology, 66*, 212-215.
- Seifert, T. L. (1993). Effects of elaborative interrogation with prose passages. *Journal of Educational Psychology, 85*, 642-651.

- Seifert, T. L. (1994). Enhancing memory for main ideas using elaborative interrogation. *Contemporary Educational Psychology*, 19, 360-366.
- van den Broek, P., Lorch, R. F. Jr., Linderholm, T., & Gustafson, M. (2001). The effects of readers' goals on inference generation and memory for texts. *Memory & Cognition*, 29, 1081-1087.
- van den Broek, P., Ridsen, K., & Husebye-Hartmann, E. (1995). The role of readers' standards for coherence in the generation of inferences during . In R. F. Lorch & E. J. O'Brien (Eds.), *Sources of coherence in reading* (pp. 353-374). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.
- van den Broek, P., Tzeng, Y., Ridsen, K., Trabasso, T., & Basche, P. (2001). Inferential questioning: Effects on comprehension of narrative texts as a function of grade and timing. *Journal of Educational Psychology*, 93, 521-529.
- Willoughby, T., Wood, E., & Khan, M. (1994). Isolating variables that impact on or detract from the effectiveness of elaboration strategies. *Journal of Educational Psychology*, 86, 279-289.
- Willoughby, T., Wood, E., Desmarais, S., Sims, S., & Kalra, M. (1997). Mechanisms that facilitate the effectiveness of elaboration strategies. *Journal of Educational Psychology*, 89, 682-685.
- Woloshyn, V. E., Willoughby, T., Wood, E., and Pressley, M. (1990). Elaborative interrogation facilitates adult learning of factual paragraphs. *Journal of Educational Psychology*, 82, 513-524.
- Wood, E., Pressley, M. & Winne, P. (1990). Elaborative interrogation effects on children's learning of factual content. *Journal of Educational Psychology*, 82, 741-748.

VITA

Graduate College
University of Nevada, Las Vegas

Matthew Thomas McCrudden

Local Address:

4641 Kelly Barry Way
Las Vegas, Nevada 89121

Home Address:

6625 Stratford Circle
Omaha, Nebraska 68137

Degrees:

Bachelor of Science in Business Administration, 1998
University of Nebraska, Lincoln

Master of Arts, Educational Psychology, 2001
University of Nebraska, Lincoln

Special Honors and Awards:

Graduate and Professional Student Association Travel Grant, UNLV (2005)
College of Education Graduate Student Travel Grant, UNLV (2005)
Graduate Research Training Assistantship, UNLV (2004)
American Psychology Association Graduate Student Seminar, Honolulu, (2004)
Alternate, President's Graduate Fellowship, UNLV (2004)
Graduate Student Research Forum, Presentation Award, UNLV (2004)
Graduate and Professional Student Association Travel Grant, UNLV (2004)
Graduate and Professional Student Association Travel Grant, UNLV (2004)
Graduate Assistant Excellence in Teaching Award, UNLV (2004)
College of Education Graduate Student Travel Grant, UNLV (2004)
Marjorie Barrick Fellowship, UNLV (2003-2004)
Finalist, Graduate Assistant Excellence in Teaching Award, UNLV (2003)
Graduate Student Research Forum, Presentation Award, UNLV (2003)
Graduate and Professional Student Association Travel Grant, UNLV (2003)
College of Education Graduate Student Travel Grant, UNLV (2003)
Graduate Research Training Assistantship, UNLV (2002)
Graduate Student Research Forum, Presentation Award, UNLV (2002)
American Educational Research Association Graduate Student Seminar, New Orleans, LA, (2002)
College of Education Graduate Student Travel Grant, UNLV (2002)

Publications:

- McCrudden, M. T., Schraw, G., & Kambe, G. (2005). The effect of relevance instructions on reading time and learning. *Journal of Educational Psychology*, 97, 88-102.
- Igo, B., Bruning R. B., & McCrudden, M. T. (in press). Exploring differences in students' copy and paste decision-making and processing: A mixed methods study. *Journal of Educational Psychology*.
- McCrudden, M., Schraw, G., Hartley, K., & Kiewra, K. (2004). The influence of presentation, organization, & example context on text learning. *Journal of Experimental Education*, 72, 289-306.
- Igo, L. B., Bruning, R. B., & McCrudden, M. (in press). Promoting encoding through electronic note taking. In G. Johnson (Ed.), *Technology-Based Education: Bringing Researchers and Practitioners Together*, Greenwich, CT: Information Age Publishing.
- Igo, L. B., Bruning, R. B., McCrudden, M., & Kauffman, D. F. (2003). InfoGather: Six experiments toward the development of an online, data-gathering tool. In R. Bruning, C.A. Horn, & L. M. Pytlik-Zillig (Eds.), *Web-based learning: What do we know? Where do we go? Nebraska symposium on information technology in education* (pp. 57-78), Greenwich, CT: Information Age Publishing.

Dissertation Title: The Effect of Specificity of Relevance Instructions on Reading Time and Learning

Dissertation Examination Committee:

- Chairperson, Dr. Gregory Schraw, Ph. D.
Committee Member, Dr. Ralph E. Reynolds, Ph. D.
Committee Member, Dr. Alice J. Corkill, Ph. D.
Graduate Faculty Representative, Dr. Jeffrey C. Shih, Ph. D.