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The Effectiveness of Two Organizational Strategies in Sixth Grade Social Studies

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THE EFFECTIVENESS OF TWO ORGANIZATIONAL STRATEGIES IN SIXTH GRADE SOCIAL STUDIES

An Abstract of a Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Masters of Arts

Liesa Brobst Bailey

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ABSTRACT

The purpose of this study was to compare the effectiveness of two organizational strategies (outlining and mapping) in sixth grade social studies. Furthermore, the study sought to determine if the effectiveness of these strategies was dependent upon student learning preference; sequential or global. The effectiveness of the two organizational strategies was determined by comparing differences in group mean scores, using a 2 x 2 factorial ANOVA repeated over one factor (organizational strategy used). The study was replicated a second time.

Students were asked to read and study information on the Canadian province, Nova Scotia, using the strategy: outlining and mapping, that complemented their learning preference: sequential or global. After a two-week study period, students completed a multiple choice, short answer posttest. Students were then asked to read and study information on the Canadian province, Prince Edward Island, using the alternative strategy: outlining or mapping. After a two week study period, students completed a multiple choice, short answer posttest.

Study 1

This study supported the hypothesis that learning preference will modify the effectiveness of an organizational strategy.

Students who were identified as having global learning preferences did better with mapping in agreement with the hypothesized relationship. However, the results do not support the idea of matching sequential learning preferences with outlining because sequential students performed equally well under both organizational strategies.

Study 2

Study 2 failed to support the hypothesis that learning preference would modify the effect of an organizational strategy. Both sequential and global students performed equally well under both organizational strategies. The findings do suggest that under outlining conditions, sequential students scored more homogeneously as compared to global students.

The lack of significance could be associated with differences in the variability of scores for both groups. Global students varied to a greater extent (*SD* = 14.46) than sequential students (*SD* = 9.94). Conversely, this lack of significance found in the simple main effect analysis could reflect a Type I Error in the decision to reject the null hypotheses regarding the interaction between learning preference and organizational strategy.

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CHAPTER I

INTRODUCTION

To empower the diverse population of students in the classroom today, teachers need to provide instruction in a variety of organizational strategies using the resources and the technology available. Organizational strategies assist the learner in arranging new information for retention and retrieval. Many students in grades fourth through eighth grade have difficulties reading, organizing notes, and recalling expository text (Berkowitz, 1986; Taylor, 1985). The need to master strategies or frameworks for remembering increases as students move into and through the upper elementary years. Much of the research from the past has dealt with older students (Moore, Readence, & Rickleman, 1983). Recent efforts in investigating strategy instruction include fourth through sixth graders (Armbruster, Anderson, & Meyer, 1991; Berkowitz, 1986; Novak & Gowan, 1984; Pehrsson & Denner, 1989).

Organization is not the only variable researchers and educators consider when they want to modify student achievement. The interaction between the organizational strategy used and student learning preferences may modify the effect on student achievement (Reynolds, 1981). During the 1980s, matching a student's learning preferences with instructional method was recommended by researchers (Carbo, 1980; Cordell, 1991; Dunn & Griggs, 1988; Jauven, 1990).

Dunn, R. and Dunn, K. (1978) define learning style as the way that students of every age are affected by their:

> (a) immediate environment, (b) own emotionality, (c) sociological needs, (d) physical characteristics, and (e) psychological inclinations when concentrating on mastering and retaining new information. (p. 2)

Advanced technology has provided neuroscientists with tools to perform further investigation of the effect cognition has on student learning and memory (Roberts & Kraft, 1989). Technology in the classroom and current research lend credence to integrating computer use as a tool across the curriculum (Barba, 1993; Hartley, 1993).

The purpose of the present study was to compare the effectiveness of two organizational strategies: outlining and mapping. Additionally, the study examined interactions between organizational strategies and student learning preferences: sequential and global. Finally, these strategies were produced in a computerized learning environment to explore its use as a delivery tool.

Background

For many students, using an outline format as a content organizing strategy and a study guide for a test has been observed to be a clear, concise strategy. There were, however, students for whom outlining was not an effective organizational or study strategy and they were frustrated.

As opposed to those who can effectively use outlines, these students spent their time trying to figure out the format of the outline. Their test scores over the social studies content were low, ranging from 50 to 70%.

An instructional goal of every teacher is to provide instruction through an organizational strategy that will enable students to successfully organize and remember text. The various needs of students require the teacher to use any of a variety of strategies described in reading journals including: mapping, cloze passages, outlining, summarizing, and rereading. Any one of these alternative strategies may be an effective organizational tool for the students and should be used when advantageous.

Problem

Students bring various needs to the learning situation and educators have a variety of strategies for understanding expository text: (a) does achievement in the social studies content area for sixth graders depend on the organizational strategy they use, and (b) does individual learning style preference modify the effectiveness of the strategy?

Purpose of the Study

The purpose of this study was to determine whether the effectiveness of two content organizational strategies, outlining and mapping, will vary dependent upon students' learning preference, sequential or global.

Hypotheses

1. There will be a significant difference between the group mean scores on social studies tests for the two organizational strategies: outlining and concept mapping.

2. There will be a significant difference between the group mean scores on social studies tests for the two learning preferences: sequential and global.

3. There will be a significant interaction on social studies tests between organizational strategy and learning preference.

Null Hypotheses

1. There will be no significant difference between the group mean scores on social studies tests for the two organizational strategies: outlining and concept mapping.

2. There will be no significant difference between the group mean scores on social studies tests for the two learning preferences: sequential and global.

3. There will be no significant interaction on social studies tests between organizational strategy and learning preference.

Variables

This study used two independent variables: (a) organizational strategy and (b) learning preference. Organizational strategy was identified to be either outlining or mapping; and the second independent or modifying variable, learning preference, was identified to include either sequential or global. The dependent variable, achievement, was represented by the group mean score on social studies posttests.

Operational Definitions

Expository text: text read to gain general or specific information.

Organizational strategy: a framework that enables the reader to identify or produce the relationships that exist among ideas in text.

Outlining: an organizational strategy; a system of progressive indentation, sequence of Roman numerals, capital letters, Arabic numerals, and lower case letters revealing a hierarchy in the order of ideas of a concept.

Mapping: a form of two dimensional diagramming which emphasizes the relationships between and among important ideas or concepts (Zeitz & Anderson-Inman, 1992). Maps can combine visual or graphic symbols with words and phrases.

Learning preference: the preferred mode of organizing and integrating new learning with prior knowledge.

Sequential: the ability to arrange thoughts and ideas in a very linear fashion and processes concepts one at a time.

Global: the ability to see the concept as a whole and then add details.

Effectiveness: producing the desired result of receiving, organizing, and retrieving expository text.

Significance of the Study

Research literature contains a limited number of studies concerning outlining (Moore et al., 1983; Salisbury, 1934; Taylor, 1985) and mapping (Berkowitz, 1986) in sixth grade social studies. These organizational strategies are promoted by curriculum publications, but have not been significantly researched. Pressley and Harris (1990) state:

> There are some powerful strategies appropriate to particular academic goals and populations. However, much more research is required before a full panorama of strategies will be available. (p. 32)

This study explores using two organizational strategies in the context of the real classroom.

Research in using the computer as a tool in creating text and mapping in regular elementary classroom instruction is growing (Cousins & Ross, 1993; Reader & Hammond, 1994; Reinking, 1993). This study will add to the body of research in the use organizational strategies and computers in the classroom.

CHAPTER II

LITERATURE REVIEW

Researchers and classroom teachers continue to seek answers to questions about student comprehension of expository text. "How can students' abilities to identify important information in expository text be improved? Can they be taught to comprehend what they've read and to organize the information in a conceptual form that will allow them to better understand it and retrieve it later?" As upper elementary school students spend more time in expository text, especially social studies, the demands on organization and memory increase. The research literature since the 1960s reveals that psychologists and teachers have been analyzing and developing strategies in an attempt to help students select pertinent information, organize it, and remember it.

In addition to studying organizational strategies, researchers have looked at what the individual learner brings to reading expository text. Ausubel and Fitzgerald (1962) investigated the interaction between the effect of an expository organizer and the student's prior knowledge on comprehension of expository text. Ausubel and Fitzgerald (1962) defined an expository organizer "as a 500-word introductory passage which provided an organizational framework for the assigned passage to be read" (p. 243).

Ausubel disputed the prevalent assumption of his time which described learning as distributed along a curve with learning being deposited at the end. Ausubel and Fitzgerald (1962) found:

> The positive interaction between the effects of the organizer and of general background knowledge suggests that the organizer better enables the subjects to put their background knowledge to effective use in structuring the unfamiliar new material. This was consistent for both initial and sequential learning. (p. 249)

Learning was an interactive process between the learner and the text to be learned.

Ausubel and Fitzgerald's empirical research sparked numerous physiological investigations of different types of organizational strategies and neurological research on how the brain and memory function. Based on their research, the present study was designed to compare the effectiveness of two expository organizational strategies: outlining and concept mapping. Additionally, the study was designed to examine if the effectiveness differed dependent upon students' learning preferences.

Learner Characteristics

Learner characteristics are the unique combination of personal attributes and traits that determine how the learner will interact in a particular learning situation.

Curry (1983) organized learner characteristics into layers:

> (a) The instructional preferences which represent the individual's preference for specific learning situations, (b) the information processing preferences which concern an individual's preferred way of grasping and assimilating information, and (c) the cognitive personality preferences which represent an underlying personality of the individual learner. (p. 3)

Memory at the three layers of learner characteristics is stored in the student's schemata. Schema Theory refers to how the knowledge of concepts is organized and stored in memory. Dunston (1992) stated, "The quantity, quality, and boundaries of the categories stored in schema are, for the most part, determined by personal experience" (p. 58). Student perception of the world is shaped by past experiences that form a referential framework called the schema.

Schema Theory applies to the way a student approaches expository text as well. Kintsch and van Dijk (1978) developed a model that helps explain how students produce cognitive organization of text. Kintsch and van Dijk (1978) found that "students develop a framework for organizing literature (i.e. fiction, poetry, expository text) through literary experience" (p. 364). As the student reads a variety of text forms, different expectations for each genre are developed. The student develops a framework for storing information about the text and then visualizes the framework when they try to recall the information.

Transfer Between Schema and Text

Mayer (1980) defined the cognitive (mental) processes that provide for the transfer between the learner's schema and the text to be learned as a series of sequential steps of encoding:

> 1. Selecting information and focusing attention on information that is relevant to the goals of the lesson or demands of the learning situation.
> 2. Organizing units of selected information and constructing logical relationships.
> 3. Integrating or linking information from text to existing cognitive structures (schemata). (p. 771)

Although students' cognitive processing has been examined in expository text such as reading, science, and mathematics, little empirical research exists in elementary social studies. Recently, researchers Armbruster et al. (1991) examined the first two steps: selection and organization of text. Armbruster et al. (1991) proposed:

> A method fourth and fifth graders could implement to organize information from expository text was to use the author's organizational structure as a guide in selecting important information. (p. 394)

Armbruster et al. (1991) selected headings, boldfaced words, and graphics from the social studies passages to create a series of frames connected by arrows as a teacher key. Another frame was a table or matrix rather than a series. Students were given blank frames to use while they read the social studies passages.

There were three experimental conditions: a student framing condition, a teacher led framing condition, and a control condition in which the teachers followed the instructions from the teacher edition. The test included multiple choice and short answer questions.

After the first test, Armbruster altered the student framing condition and the teachers were allowed to instruct students in creating short answers in preparation for the tests. Armbruster created paragraphs of information containing missing words and students cut out paragraphs, wrote in the missing words, and glued them in the frames. Students in the student framing condition worked in small cooperative groups. Teachers gave students prompt questions on material related to the chapter to practice short answers on the test. Results of the study showed a main effect due to the treatment condition was statistically significant, $F(1,2763) = 22.7$, $MSe = 296.5$, $p < .0001$. Variables altered during the study made it difficult to determine whether individual students could use this organizational strategy effectively.

Students were able to make connections between the author's structure of the expository text and important information to fill in the visual organization of the frame.

Armbruster et al. (1991) stated:

> Framing is not effective with some social studies text such as geography. The framing conducted in this study was highly teacher-directed and therefore would not complement some teaching styles. (p. 415)

Taylor (1985) had similar results when she had sixth grade students prepare summaries based on outlines they had constructed using the author's text structure. The results of these studies were highly dependent on students using the author's text structure to find important information in text. Neither research study took into consideration the individual learning preferences of the students.

Physiological Differences

Educators recognize individual information processing preferences in student learning and achievement. These differences influence the manner in which a reader selects, perceives, and organizes information for meaningful learning. Pines and Novak (1985) define meaningful learning as:

> For a given student, will be the availability of relevant concepts and associated propositions, and the desire or psychological set to assimilate new information into these concepts and propositions. (p. 215)

In other psychological research (Fountain & Fillmer, 1987; Webb, 1983) revealed similar results concerning the individuality of learners. Learners experience cerebral dominance when one hemisphere is activated over the other. Cerebral research suggests the differences in brain function are partially the cause of individual information processing preferences. Dunn, R. and Dunn, K. (1975) define two information processing preferences: analytical[1] and global. They define analytical as:

> Analytical learners access the left hemisphere and prefer sequential, logical, and critical information processing. They enjoy identifying facts, details, and names. (p. 18)

Global learners are defined as:

> Global learners access the right hemisphere specializing in holistic and feature analysis. Global learners require an overall comprehension of the concept, process subjectively, and in patterns. (p. 18)

Neuroscientists have developed silent reading comprehension tests measuring whether the learner is using the right or left brain hemisphere to process information. Roberts and Kraft (1989) used an electroencephalograph (EEG) to measure alpha levels to determine hemispheric engagement while reading. A high alpha level in a hemisphere indicates the hemisphere is not being used for silent reading. They found that sixth grade students, who had higher comprehension scores were using both hemispheres.

High scoring first graders, learning to read with phonic instruction, were using the left hemisphere. From their study, Roberts and Kraft (1989) suggested analytical/sequential processing of the left hemisphere was used more often by younger, higher scoring readers. Roberts and Kraft (1989) suggested that reading comprehension improvement was due to the reader's ability to use several strategies:

> There is a relative shift from strict reliance on a few left-hemisphere lateralized strategies, linguistic and sequential, to a dynamic and automatic flow of strategies interhemispherically which result in a greater use of bilateral hemispheric processing. (p. 326)

In a study involving fourth graders and seventh graders, Fountain and Fillmer (1987) found the following:

> Students do have different hemispheric processing preferences, and there is a relationship between academic achievement and hemispheric preferences. If an education focuses mainly on left hemisphere skills at the expense of right hemisphere skills, then students who prefer using their right hemispheres will not achieve success as often as their peers. (p. 255)

Webb (1983) recommends:

> For learners with dominant preferences, teaching activities should be introduced through the dominant preference, but later directed at the other for appropriate development. (p. 510)

Research indicates that there is a need for closer scrutiny of students' individual information processing preference prior to entry into new learning.

Learning is best accomplished for different people through various approaches because of differing physiological needs (Dunn, R., & Dunn, K., 1978; Frank, 1983; Trautman, 1979). Several assessment instruments have been developed to measure student learning preferences: "Learning Style Inventory" (Canfield & Lafferty, 1970); "Teacher Assessment of Student Learning Styles" (Hunt, 1979); "Inventory of Learning Processes" (Schmeck & Ramanaiah, 1977); and "CAPSOL " (Conrath, 1985).

The CAPSOL was used to assess students involved in the present study. The CAPSOL is a 45-item instrument designed to measure two informational processing preferences: sequential and global. Conrath (1985) defines sequential in the CAPSOL as, "the ability to arrange thoughts and ideas in a very linear, logical fashion, and to create detailed lists" (p. 10). Conrath (1985) defines global in the CAPSOL as, "the ability to be fluid, see the main concept, and order thoughts and ideas randomly" (p. 6).

Meaningful Learning

Mayer (1976) defines meaningful learning as dependent on the following conditions:

> 1. The material to be learned must be received.
> 2. The learner must have prior knowledge ready to assimilate the new learning.
> 3. The learner must actively absorb and incorporate the new learning into existing schemata. (p. 143)

When these conditions are met, encoding of the new learning occurs producing superior transfer performance. Past research has placed emphasis on one or more of these steps. Ausubel and Fitzgerald (1962) determined, "the key to meaningful learning was the students' prior knowledge" (p. 243). Tulving and Thomson (1973) defined step three of the process as "the 'encoding specificity principle;' the ability to remember depends on what the information is and how it is stored" (p. 352).

Recent investigations into cognitive preferences by psychologists and educators suggest that individuals do select, perceive, organize, and assimilate new learning according to their individual informational processing preferences. The present study attempts to assess the individual informational processing preferences, sequential and global, and provide complementary organizational strategy instruction.

Strategies for Expository Text

Mayer (1980) defines a strategy as:

> An activity aimed at making the learner actively integrate new information with existing knowledge affecting encoding, storage, and eventual use of new material on performance tests. (p. 770)

Strategies can be classified as embedded or detached. Embedded strategies are specific to the content and are not generalizable to other content.

Detached strategies such as outlining and concept mapping can be applied to a variety of content. Research in strategy instruction has revealed that strategies are most effective when the students construct information throughout the process of learning new information (Berkowitz, 1986; Novak, Gowin, & Johansen, 1983; Simpson, 1929; Zeitz & Anderson-Inman, 1992).

The literature is replete with strategies for improving student acquisition of important information in expository text. Two expository text strategies that have proven effective for learning are outlining and mapping. Outlining is a strategy students can use to identify and separate main ideas from subordinate ideas in a hierarchy (Kloster & Winne, 1989; Proger, Carter, Mann, Taylor, & Bayuk, 1973; Simpson, 1929). Simpson (1929) working with 1,074 fifth, sixth, and seventh graders examined studying for a history test using four processes: selecting important information, outlining, summarizing, and answering questions. The results revealed the process of outlining at 1.37, was significantly greater than answering questions at .84, evaluating at .77, and summarizing at .64.

Mapping is a spatial organizational strategy used to show organization, presentation, and concept links. A map is a two-dimensional spatial display that presents information in the form of nodes and named or unnamed links.

Several research articles present the results of their work (Armbruster et al., 1991; Berkowitz, 1986; McCagg & Dansereau, 1991; Novak et al., 1983; Stensvold & Wilson, 1990; Zeitz & Anderson-Inman, 1992).

McCagg and Dansereau (1991) compared a form of mapping, a K-map, with students' own strategies. The purpose of their study was to examine student generated K-maps or knowledge maps. Teachers modeled the mapping procedure on the overhead and in handouts. Students were given the expository text to read and asked to create their own K-maps of the text. The results indicated mapping improved student performance on recognition, significantly higher, $F(1,79) = 26.13$, $p < .001$, $MSe = 9.41$, and on recall tests $F(1,79) = 13.3$, $p < .001$, $MSe = 10,227.3$. McCagg and Danserau (1991) suggest:

> Determining the relative merits and drawbacks of student mapping compared with other types of supplemental strategies, such as notetaking, remains the province of future research. (p. 323)

Computer-Based Strategy Instruction

The computer is a fluid medium making revision and restructuring less tedious. It is a tool for individualized instruction and if appropriate computer programs are available, can be used to create outlines and concept maps.

In a comparative study in teaching thinking skills by teaching with the computer, Cousins and Ross (1992) list six reasons for choosing the computer as a tool for their study:

> 1. The ability to quickly revise existing documents.
> 2. Graphical representation of text is likely to enhance and enrich the user's perspective and interpretation abilities.
> 3. The learner is able to work with the medium to construct knowledge as opposed to the medium delivering knowledge to the learner.
> 4. Instructors are able to facilitate students processing through conferencing or while other students are occupied in their own processing. (p. 98)

Several studies have investigated using the computer as a tool for writing (Hartley, 1993), and mapping (McCagg & Danserau, 1991; Reader & Hammond, 1994). Hartley (1993) states:

> The results did not indicate a significate effect for quality, but there was an interaction with ability. The word-processing significantly helped the lessable students by making revision less tedious. (p. 24)

Reader and Hammond (1994) compared computer-based concept mapping with computer notetaking. The students were asked to read material that was contained in a computer file and were given instructions to use a notetaking tool for written notes or Hypercard for mapping. The results on the posttest revealed that students using the mapping tool scored higher than those using a notetaking tool on relational questions and equally well on factual recall.

Reader and Hammond (1994) and Zeitz and Anderson-Inman (1992) noted that students need to be given time for revision. The computer as a tool relieves the students of the tedium of erasing and rewriting. Reader and Hammond (1994) suggested "encouraging students to link concepts by first giving them a framework of higher level concepts and then they could read and link the subordinate nodes" (p. 105).

The review of the literature raises several questions. Is there one organizational strategy that will serve all students equally well? What effect do personal learning preferences have on organizational strategy instruction? Is the computer an appropriate tool for construction of outlines and concept maps?

CHAPTER III

METHOD AND DESIGN

Subjects

Twenty-eight sixth grade students (13 females and 15 males) participated in this study. The participants were a convenience sample of 170 sixth grade students in the Waverly-Shell Rock School District. Reading comprehension scores for this sample were taken from the 1992 Iowa Test of Basic Skills. The scores ranged from an Iowa Percentile Rank (IPR) of 8 to 96%, and a National Percentile Rank (NPR) of 18 to 98%. One fourth of the sample tested at or below the IPR of 30%, and one fourth of the sample scored at or above the IPR of 78%.

This sample is representative of the sixth grade population (WSR) based on student class assignment (one fourth upper ability, one fourth above average ability, one fourth below average ability, and one fourth low ability). Washington Irving Elementary is located in an urban area surrounded by rural farmland in the Midwestern section of the United States. The socioeconomic level of the parents ranges from lower to upper middle class.

Learning Preference Assessment

The school guidance counselor administered and scored the CAPSOL Style of Learning Assessment for the 28 students to determine whether students had a sequential or global learning preference. The results of the assessment revealed 14 students were sequential and 14 were global.

Setting

The sixth grade classroom was one of 6 sixth grade classrooms located in the southern wing of the elementary building. The classroom was equipped with an overhead projector and screen in the front of the room. Student desks were arranged in rows facing the overhead.

The computer lab was located in the northern wing of the building and housed 28 NOVELL/ICLASS networked Hewlett Packard computers. Each computer had a color monitor and each was networked to the HP Deskjet printer. Programs on the network server included Microsoft Works 2.0 and IBM Linkway. The computer lab was reserved by the teacher on a yearly basis. The students went to the lab as a class and worked for one half hour each day.

Materials

The CAPSOL Style of Learning Assessment, a computerized Assessment Program created by John M. Conrath, Ph.D. (1990), was used to assess student learning preferences. The CAPSOL is a 45-item instrument designed to measure nine learning preferences (Appendix A). For the purposes of this study, the results of the sequential and global learning preferences were used to hypothesize that sequential learners using outlining and global learners using concept mapping would perform better on posttests than when sequential and global students used the alternative strategy.

The CAPSOL was field tested with elementary, junior high, and high school students. Construct validity of the CAPSOL was established through factor analysis. Responses to the 45 items of the CAPSOL by 500 elementary, junior high, and secondary students were factor analyzed using orthogonal rotation (VARIMAX) in order to identify commonalities among the items. The arbitrary criteria for an item to represent a factor was a factor loading of .40. Any item below this was modified or replaced until all of the items met the criteria. Reliability of the CAPSOL was determined by administering the instrument to 48 fifth and sixth grade students in a test-retest situation. A Pearson's r was calculated for each of the 45 items to determine the correlation between the responses to the items from the the first to second administration of the CAPSOL. A mean correlation coefficient was also calculated to estimate test-retest reliability of the instrument. Correlation coefficients for the 45 items ranged from 0.52 to 0.93. The mean correlation coefficient for the items was 0.74.

The handout, Five Themes of Geography (Appendix B), served as a reminder for students to look in the province books for information related to the five themes. The five themes were also used as main headings in the outlines and main nodes in the concept maps the teacher and students constructed individually.

Teacher constructed multiple choice, short answer posttests (Appendices D-G) were used to evaluate students after they had a two-week time period to independently read, organize, and study information on one province. The tests were paper and pencil tests. Each test listed five questions directly corresponding in order and content to the five geography themes listed on the handout.

Passages from the Discover Canada series by Grolier Limited (1991) and published in Toronto, Canada, were used for social studies content. The provinces: Nova Scotia, Prince Edward Island, Quebec, and Ontario were four Canadian provinces selected for this study; they were studied in the order listed. The province books were stored in plastic crates which could be easily moved between the classroom and computer lab, so they would be available in either room.

Microsoft Works 2.0, a computer word processing program, was used for producing the outlines. The students had used this program to write letters, stories, poems, and state reports in fifth grade.

IBM Linkway, a computer program with the capacity to graphically display text, was used to produce concept maps. Students could connect concepts by drawing a line between nodes and could identify relationships between concepts by keyboarding a descriptive word across the line halfway between the concepts, labeling the relationship.

Students had used this program to draw and create geometric designs and landscapes for art class in fifth grade.

Students were required to keep an individual folder containing the Five Themes in Geography handout and paper rough drafts of outlines and concept maps. They carried the folders to the computer lab and back to the classroom for storage on the shelves in the front of the classroom.

Each student had his or her own computer disk to store computer-based outlines and maps. The disks were kept in a classroom storage box in the computer lab. Students accessed the network for programs using their six digit student identification numbers.

Design

The experimental design for this study was a 2 x 2 within-subjects factorial design. The independent variable is represented by the organizational strategies: outlining and mapping, the second independent or moderating variable is represented by the learning preferences: sequential and global. The dependent variable is the posttest score. The study was replicated once.

Procedure

Five Themes of Geography

The teacher reminded the class that they studied the States in fifth grade and information on Iowa should be familiar. The classroom teacher passed out the Five Themes handout (Appendix B) and asked the class to read the handout.

She asked the class if they could think of ways to apply the headings and the questions on the handout to their state, Iowa. She explained that they would be researching information on four separate provinces in Canada in four weeks. The handout would serve as a reminder for them to look for information that would be related to the five themes of geography when they read about the provinces.

Computer Keyboarding Review

All students reviewed keyboarding skills for two weeks. The students had keyboarding technique in fifth grade and this review was meant to help them remember where to find the keys and practice using the keyboard.

Introduction to Outlining

During the second week of the study, the teacher gave preliminary outlining instruction on the overhead in the classroom. She used Iowa as the model social studies content as students were familiar with Iowa (Appendix B).

Later, when the students practiced creating outlines on the computer, they would work with familiar content and could concentrate on learning the mechanics of creating the outline. Together, with the teacher directing and modeling on the overhead, the class completed individual paper Iowa outlines (Appendix C).

Student copies were handed in to the teacher to be checked for errors in form, content, and completeness. Corrected outlines were returned the next day to be stored in individual student folders.

Computer Outlining Instruction

Students brought their paper outlines of Iowa to the computer lab at the beginning of the third week. They used the paper draft as a guide in creating their computer outline. The classroom teacher led the whole class through the process of creating an outline on the computer. The media aide joined the classroom teacher in answering any questions on outline construction or revision.

Students were given one week, 30 minutes daily, to create an outline on the computer that matched the Iowa paper outline. Students evaluated their own outlines for form, content, and completeness and did any revision on the computer. The teacher instructed the students to create a new computer file and asked them to keyboard as much of the outline on the new file as they remembered. Students could look back to the original file for the information they did not initially remember. The information they had difficulty remembering should be the information they studied.

Introduction to Concept Mapping

During the third week of the study, the teacher gave preliminary concept mapping instruction on the overhead in the classroom. She wrote the word, Iowa, in the center.

Clockwise around Iowa, she wrote the words: location, place, interaction, movement, and regions. She asked the students to volunteer information that could be linked to each word. Together, with the teacher directing and using the overhead, the class completed individual Iowa concept maps and the student paper copies were collected. The teacher checked for errors in form, content, and completeness. Corrected concept maps were returned the next day to be stored in individual student folders.

Computer Mapping Instruction

Students brought their paper concept maps of Iowa to the computer lab at the beginning of the fourth week. They used the paper draft as a guide in creating their computer maps. The classroom teacher led the whole class through the process of creating a concept map on the computer. The media aide joined the classroom teacher in answering any questions on concept map construction and revision.

Students were given one week, 30 minutes daily, to create a concept map on the computer that matched the Iowa paper concept map. Students evaluated their own concept map for form, content, and completeness and did revision on the computer. Students were told to study the concept map by creating a new file and from memory trying to recreate the information they had placed on the original map. They returned to the first computer map to look for missing information.

Study 1

During the fifth week of the study, students were asked to read and study information on the Canadian province, Nova Scotia, using either the outlining or mapping strategy, that complemented their learning preference: sequential or global. Students created either an outline or concept map on the computer using the Five Themes handout as a reminder to identify important information in expository text. When students completed the outline or concept map they studied the information on the monitor and created a new file reconstructing from the memory the original outline or concept map. After a two-week study period, students completed a multiple choice, short answer posttest (Appendix D).

During the seventh week of the study, students were asked to read and study information on the second Canadian province, Prince Edward Island, using the alternative strategy: outlining or mapping. After two weeks, students completed a multiple choice, short answer posttest (Appendix E).

Study 2

The ninth week of the study, the students were asked to read and study information on the Canadian province, Quebec, using the strategy: outlining or mapping, that complemented their learning preference: sequential or global.

After a two-week study period, students completed a multiple choice, short answer posttest designed to measure recall of detail and comprehension of the concepts (Appendix F).

During the 11th week of the study students were asked to read and study information on the fourth Canadian province, Ontario, using the alternative strategy: outlining or mapping. After two weeks, students completed a multiple choice, short answer posttest (Appendix G).

CHAPTER IV

RESULTS

The purpose of this study was to compare the effectiveness of two organizational strategies: outlining and concept mapping. Additionally, the study examined if effectiveness differed dependent upon students' learning preference: sequential and global. The effectiveness was determined by comparing differences in group mean scores, using a 2 x 2 factorial ANOVA repeated over one factor (organizational strategy used). The study was replicated a second time.

Study 1

Students were asked to read and study information on the Canadian province, Nova Scotia, using the strategy: outlining or mapping, that complemented their learning preference: sequential or global. After a two-week study period, students completed a multiple choice, short answer posttest designed to measure recall of detail and comprehension of the concepts concerning the province. The 100 point tests were scored according to objective predetermined keys. Students were then asked to read and study information on the Canadian province, Prince Edward Island, using the alternative strategy: outlining or mapping.

After two weeks, students completed a multiple choice, short answer posttest. The 100 point posttest was scored according to an objective predetermined key. The results show there was no significant effect for learning style $F(1,26) = .38$, ns, there was no significant effect for strategy used $F(1,26) = 2.26$, ns, and there was a significant interaction between learning preference and strategy $F(1,26) = 14.47$, $p < .0008$. A simple main effect analysis was performed to examine the nature of the interaction. Table 1 presents the results of the summary of the ANOVA.

Table 1

Analysis of Variance by Source

		Variance		
Source	DF	MS	F	p <
Preference	1	21.87	0.38	0.7063
Between subject error	1	825.44	(14.47)	0.0008
Strategy	1	129.01	2.26	0.1446
Within subject error	26	150.72	2.64	0.008

When students studied under the mapping condition, there were no statistically significant differences among global and sequential students $F(1,26) = 2.14$, $p <$ ns (Table 2).

Table 2

Strategy and Learning Preference Means and Standard Deviations for Social Studies Achievement

		Learning Preference					
		Sequential		Global		Total	
Strategy	N	M	SD	M	SD	M	SD
Outline	14	91.07	8.80	82.14	10.69	86.60	9.53
Mapping	14	86.42	12.46	92.85	8.25	89.64	11.85
Total	28	88.75	10.85	87.50	10.84		

When students studied under the outlining condition there was a significant inequality among global and sequential students $F(1,26) = 7.66$, $p < .05$. The sequential students ($M = 91.07$, SD 8.80) outperformed the global students ($M = 82.16$, SD 8.25).

Study 2

The study was replicated on a second set of material. Students were asked to take notes and study two provinces.

First, students were asked to study the Canadian province, Quebec, using the organizational strategy: outlining or mapping that complemented their learning preference: sequential and global. After two weeks, students were administered a multiple choice, short answer posttest. The 100 point posttest was scored according to an objective predetermined key.

Students were then asked to read and study information on a fourth Canadian province, Ontario, using the alternative organizational strategy: outlining or mapping. After two weeks, students were administered a multiple choice, short answer posttest.

The results showed there was no significant effect for learning preference $F(1,26) = .14$, ns, there was no significant effect for strategy used $F(1,26) = .58$, ns, and there was a significant interaction between learning preference and strategy $F(1,26) = 4.31$, $p < .05$. A simple main effect analysis was performed to examine the nature of the interaction. Table 3 summarizes the results of the ANOVA.

Table 3

Analysis of Variance by Source

		Variance		
Source	DF	MS	F	p <
Preference	1	44.64	0.14	0.707
Between subject error	1	644.64	4.31	0.048
Strategy	1	87.50	.58	0.4515
Within subject error	26	309.06	2.06	0.0351

When students studied under the mapping condition there were no statistically significant differences among global and sequential students $F(1,26) = .57$, $p < .43$). When students studied under the outlining condition no statistically significant differences were found $F(1,26) = 3.34$, $p < .07$). The results can be observed in Table 4.

Table 4

Strategy and Learning Preference Means and Standard Deviations for Tests of Social Studies Achievement

		Learning Preference					
		Sequential		Global		Total	
Strategy	N	M	SD	M	SD	M	SD
Outline	14	87.14	9.94	78.57	14.46	82.85	12.94
Mapping	14	77.85	18.88	82.85	15.89	80.35	17.31
Total	28	82.50	15.54	80.71	15.07		

CHAPTER V

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Study 1

This study supported the hypothesis that learning preference will modify the effectiveness of an organizational strategy. Students who were identified as global did better with mapping, in agreement with the hypothesized relationship. However, the results did not support the idea of matching sequential with outlining because sequential students performed equally well under both organizational strategies.

Study 2

Study 2 failed to support the hypothesis that learning preference would modify the effect of an organizational strategy. Both sequential and global students performed equally well under both organizational strategies. The findings did suggest that under outlining conditions, sequential students scored more homogeneously as compared to global students.

Discussion

The lack of significance could be associated with differences in the variability of scores for both groups. Global students varied to a greater extent (*SD* = 14.46) than sequential students (*SD* = 9.94).

Conversely, this lack of significance found in the simple main effect analysis could reflect a Type I Error in the decision to reject the null hypotheses regarding the interaction between learning preference and organizational strategy. A closer examination of the global students' scores revealed one student with an extremely low score of .45 which could account for the wide variation in global scores and standard deviations.

Another possible effect could be as Webb (1983) stated, "For learners with dominant preferences, teaching activities should be introduced through the dominant preference, but later directed at the other for appropriate development" (p. 510). Global students who initially learned to organize by mapping could later use outlining as an organizational strategy.

Recommendations

1. Replicate the study for a longer period of time.
2. Perform quantitative research on the effect computers have on using strategies in the classroom.
3. Expand the study to include other organizational strategies for comparison.
4. Develop a qualitative research format to investigate student strategies.

FOOTNOTES

[1]Analytical is a term used in the literature to defines learner who prefers to learn by separating the concept into parts and this is the term Dunn, R. and Dunn, K. (1975) have chosen to use when they define learning styles. Conrath, on the other hand, uses the term sequential to define the learner who prefers to learn by separating the concept into parts.

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APPENDIX A

HIGH PREFERENCES

VISUAL — PERCEIVING THE WRITTEN NUMBER AND WORD
1. Use task cards, films, filmstrips and other such visual materials.
2. Take notes in class.
3. Work problems on the chalkboard and on paper.
4. Use workbooks and notebooks.
5. Use imagination and think in pictures.

AUDITORY — PERCEIVING THE SPOKEN NUMBER AND WORD
1. Use tape recorders, records and radio.
2. Be involved in classroom lectures and discussions.
3. Practice or review out loud.
4. Participate in oral reports, debates and plays.
5. Talk through problems.

BODILY-KINESTHETIC — INVOLVING ALL SENSES IN THE LEARNING PROCESS
1. Use plays, pantomime, debate and other such action activities.
2. Use task cards, electroboards and learning circles.
3. Use cereal, spaghetti or cut out letters when learning new words.
4. Have abacus, chisanbop and cuisinaire rods when doing math.
5. Use rhythm when learning lists.

INDIVIDUAL LEARNER — PREFERENCE TO STUDY AND WORK ALONE
1. Use computers, tape recorders and VCRs.
2. Have a quiet place to study and learn alone.
3. Use WORKSHOP WAY and other learning center approaches.
4. Use programmed learning and instructional packages.
5. Use match and flash cards, vocabulary and test question envelopes.

GROUP LEARNER — PREFERENCE TO STUDY AND WORK IN A GROUP
1. Use small group techniques such as: discussions, CIRCLE OF KNOWLEDGE, brainstorming.
2. Use laboratory teams in Science.
3. Be involved in simulating what is being learned.
4. Use TEAMS-GAMES AND TOURNAMENTS.
5. Structure need for goal interdependence.

ORAL EXPRESSIVE — DESIRE TO SPEAK TO INDIVIDUALS OR A GROUP
1. Make oral reports.
2. Use panel discussions and debates.
3. Put thoughts on cassettes.
4. Participate in class discussions and lectures.
5. Participate in Science Fairs and OLYMPICS OF THE MIND.

WRITTEN EXPRESSIVE — DESIRE TO DO WRITTEN WORK
1. Use written reports, essay exams and journals.
2. Be involved in YOUNG AUTHORS and other such writing programs.
3. Use lecture note taking.
4. Wait 5-10 seconds after a question is asked, to provide time to think.
5. Provide for creative writing experiences.

SEQUENTIAL — PROCESSING STEP BY STEP
1. Provide and develop outlines.
2. Have missing words in stories or descriptions.
3. Use phonetic methods for language.
4. Break stories and descriptions into small parts.
5. Use crossword puzzles, skill exercise and worksheets.

GLOBAL — PROCESSING BY UNDERSTANDING THE WHOLE
1. Have general overview of lesson prior to presentation.
2. Involve fantasy, humor and appeal to emotions.
3. Experience whole story and then take it apart.
4. Use skimming techniques.
5. Have drawings, graphs, pictures and imaginative words in stories or descriptions

APPENDIX B

The Five Themes of Geography

Location: the exact location of a place on the earth's surface.

What are the latitude and longitude coordinates of this province?

Where is this province located in relation to other provinces, countries, continents, or landforms?

Place: the physical and human characteristics of a place that set it apart from other places.

Describe this province's landforms, natural resources, plants, and animals.

Describe this province's schools, homes, music, art, foods, national holidays, and types of recreation.

Interaction within places: how humans interact with the environment of a place-with both good and bad results.

How do the people of this province use their natural resources?

How do the people and industries treat their environment?

How do the people of this province make their living?

Movement: the movement of people, products, information, and ideas within a province and between provinces.

Where do the majority of people live in this province and what means do they use to travel and communicate?

How are people, goods, services, and ideas moved to and from parts this province?

Regions: how regions form and change.

What political regions are located within this province and what are their unique characteristics?

What are some of the major tourist attractions found in this province?

APPENDIX C

Iowa Model Outline

I. Location of Iowa
   A. Latitude: 40 - 44 NW, Longitude 90 - 97 NW
   B. Borders
      1. N - Minnesota, S - Missouri
      2. E - Wisconsin, Illinois, W - Nebraska
   C. Mississippi River is eastern border
   D. Missouri River along western border

II. Place
   A. Iowa's capital is Des Moines
   B. Landforms, resources
      1. Northeastern hill section
      2. Farmland, wooded river areas
      3. Soft coal deposits
   C. Ethnic groups
      1. German, Dutch, Scandinavian
      2. Smaller pop. of European, Hispanic, African, Asian.
   D. Holidays
      1. City and town festivals in summer
      2. Ragbry
   E. Recreation
      1. State Parks: camping, trails
      2. State Fair, 4-H and County Fairs
      3. Bike trails, hiking, fishing

III. Interaction
   A. Rich farmland
      1. Farmers produce soybeans, corn, grains
      2. Pigs, dairy cows, steer, poultry
   B. Forests produce some hardwood: oak and walnut
   C. Urban area industries
      1. Rockwell Industries, Waterloo Industries
      2. John Deere: farm and road equipment
   D. Ecology
      1. Test for chemicals in water and soil
      2. Conservation of disappearing topsoil

IV. Movement
   A. Planes, trains, buses, semi-trucks
   B. Cars, vans, motorcycles, horse and buggy
   C. Phones, mail, UPS, fax, modem, fiber optics

V. Regions
   A. Agricultural and animal husbandry
   B. Urban industrial
   C. Ethnic towns and villages
   D. Northeastern hills

APPENDIX D

Nova Scotia Posttest Student I.D.#_____

Directions: Read each of the questions and either fill in the blank or write out answers to the questions in complete sentences. You may use the back of this paper or staple paper to the test sheet, if you need more room.

1. The location of Nova Scotia is between the ____ and ____ parallels.

a) 30 SW and 45 SW b) 80 NW and 90 NW c) 40 NW and 50 NW

2.____(True/False) The Bay of Fundy has the highest tides in the world.

3. List two ways people are affecting the environment in Nova Scotia and describe how the people are trying to take care of these two situations.

4. Name two natural resources in Nova Scotia and describe how they are used in industry. Describe how the natural resources are transported to industrial sites and how the finished products are transported to buyers.

5. In a paragraph describe two ethnic groups you might see in Nova Scotia and the major regions of this province.

APPENDIX E

Prince Edward Island Posttest Student I.D.#_____

Directions: Read each of the questions and either fill in the blank or write out answers to the questions in complete sentences. You may use the back of this paper or staple paper to the test sheet, if you need more room.

1. The location of Prince Edward Island is to the _____ of the Nova Scotia.

a) northeast b) southwest c) southeast d) northwest

2.___(T/F) Prince Edward Island is the smallest province of Canada.

3. Many large animals were living on the island before Europeans arrived. Name two animals that are no longer on the island and describe why they're gone. Why are there few deciduous trees on this island?

4. Where do a majority of the people live on the island and how do they leave and return to the island? What products can you purchase if you visited the island?

5. Why is the climate of this island so different from Nova Scotia? What are the regions on the island?

APPENDIX F

Quebec Posttest Student I.D.#_____

Directions: Read each of the questions and either fill in the blank or write out answers to the questions in complete sentences. You may use the back of test or staple paper to the test sheet, if you need more room.

1. The province of Quebec is_____.

   a) east of Nova Scotia and north of U.S.
   b) west of Prince Edward and north of New York.
   c) east of Ontario and west of Wisconsin.

2. Quebec is home to almost half of Canada's_____.

a) mining b) hydropower c) aerospace industry d) forestry

3. Describe how the different cultures treat each other in Quebec. Describe the environmental problems this province is trying to correct.

4. Describe how you might travel to Prince Edward Island if you lived in this province and where you would live if you enjoyed large urban areas.

5. Describe the political regions that are part of Quebec and tell how these regions affect the people in the rest of Canada.

APPENDIX G

Ontario Posttest Student I.D.#_____

Directions: Read each of the questions and either fill in the blank or write out answers to the questions in complete sentences. You may use the back of the test or staple paper to the test, if you need more room.

1. Ontario lies between the _____meridians.

a) 75 - 95 W b) 65 - 80 W c) 70 - 90 E d) 60 - 80 E

2.____(T/F) The provincial capital is Toronto and the Canadian national government meets there.

3. Unfortunately, there are also pollution problems that Ontario must work to correct. Describe two pollution problems and what is being done to correct them.

4. What types of transportation would be possible for you to use as you travel across Ontario? How could you contact your family in the U.S.A.?

5. Describe three of the regions you would see if you traveled across this province.