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Effects of New Science Textbooks on Selected Sixth and Eighth Grade Students at Crestwood Elementary School, Paris, Illinois

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Effects of New Science Textbooks on Selected Sixth and Eighth Grade Students at Crestwood Elementary School, Paris, Illinois.

(TITLE)

BY

David R. Pruim

(Field Experience)

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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Abstract

This paper describes the results of a six-month field study to determine the effects of a newly adopted and implemented junior-high level science textbook series on student achievement. This study took place in the sixth, seventh, and eighth grade science classrooms of Crestwood Elementary School, Paris, Illinois, from December 1988, until May of 1989. This study compared the science achievement of two groups of students in both their sixth and eighth grade years. The Normal Curve Equivalents or NCE's and letter grades as given by the junior-high level science teachers at Crestwood, were analyzed using non-independent t tests. Descriptive data was obtained by using two Likert-type surveys. The first Likert-type survey instrument was used to determine if the three junior-high science teachers varied in significant ways as to their usages and applications of the new science textbook series, in their classrooms. The second Likert-type survey instrument was used to survey the experimental group (this years eighth graders at Crestwood which were the only group of students exposed to the treatment variable) in regard to their feelings toward the new science textbook series, and as to whether or not their new science textbook series was easier to read and/or understand than the previous textbook series. Findings from the non-independent t-tests determined that the NCE's and letter grades were statistically significant (with the exception of the Class of 1988's NCE scores) at the pre-set level of .05. Findings from the descriptive data suggest that there is a significant amount of variation among the three junior-high science teachers at Crestwood in terms of: text usages, frequency of usage, classroom level objectives, content, ideas, concepts, and knowledges related to what is taught at the classroom level. The hypothesis suggesting that the change in textbook series was statistically significant in regard to higher NCE's on standardized test scores is supported. The hypothesis suggesting that the change in textbook series was statistically significant in regard to higher grades earned by students in science is rejected.

Table Of Contents

Chapter I - Overview Of The Problem.....3

Introduction.....3

Demographics.....3

Statement of The Problem.....5

Limitations of The Study.....6

Definition of Terms.....8

Standardized Tests.....8

New Science Texts.....9

Crestwood's Science Teachers.....9

Student Population.....9

Required Attendance Criteria.....9

Student Achievement.....10

Chapter II - Rationale, Related Literature And Research..11

Rationale.....11

Review of The Literature.....12

Text Readability, Writing and Organizational Patterns.....12

Text Content and Text Improvement.....18

Text Usages Within the Science Curriculum.....21

Text Selection/Adoption Systems and Implementation.....29

Text Publishing/Suggestions.....42

Usage of Text Research.....44

Review of Related Research.....45

Text Organization/Patterns/Usages.....45

Text Adoption/Selection/Criterion Issues.....49
Text and Content Issues in Science Curriculum.....52
Reading/Text Strategies.....55
Literature/Research Summary.....57
Chapter III - Design Of The Study.....65
General Design of The Study.....65
Hypotheses.....65
Sample and Population.....66
Data Collection and Instrumentation.....67
Survey Sample Questions.....68
Data Analysis.....69
Chapter IV - Results.....70
Data Analysis of NCE's and Grades.....71
Teacher Survey.....72
Student Survey.....94
Chapter V - Summary, Findings, Conclusions, And Recommendations.....101
Summary.....101
Findings.....102
Conclusions.....104
Recommendations.....104
Further Research.....107
References.....109-121
Appendixes.....122-128

Chapter I

Overview of the Problem

Introduction

This field experience examines the relationship between a newly adopted series of science textbooks and the levels of student achievement in an specific elementary school setting. The relationships between the newly adopted texts and levels of student achievement are the general focus of this study. The specific objective of this study, however, is to determine if any changes in general student achievement levels can be attributed to the newly adopted science textbook series.

Demographics

Crestwood Elementary School is the only school building in a unit district surrounding Paris, Illinois. Crestwood Elementary School, Paris, Illinois has its own set of distinct organizational characteristics which form the background and setting for this field experience. Formally known as The Edgar Community Unit District Number Four, it was formed officially in 1954 as a result of the consolidation of thirty-six smaller country schools (Zuber, 1988). This district is approximately two hundred and thirty four miles in size and, geographically, encircles the city of Paris (Zuber, 1988). Since the completion of the original building in 1955, two additions

have been built to provide the necessary space for both additional classrooms and offices (Zuber, 1988).

The area's economy is primarily based on agriculture and agriculturally-related industries. However, Paris, Illinois, is best characterized as a rural residential area.

The district's total K-12 enrollment is approximately 1,000 students and this district is very unique in that it is the only district in the state of Illinois with full unit district status, that is allowed to tuition out its graduating students to Paris High School (Zuber, 1988). The high school students sent to Paris High School are also included in the above enrollment figure for Unit 4.

Unit 4 employs: one superintendent, one building-level principal, forty-seven certified staff members, thirty-three non-certified staff members, and several neighborhood volunteers. These volunteers provide a variety of services although they are not officially considered to be employees, and are not renumerated for their services (Regional Superintendent's Statistics, 1988).

Attempts to pass various tax referenda failed, until an increase of fifty-seven cents passed in March of 1986 (Zuber, 1988). This increase was only to raise monies in the education fund. Despite the precarious financial

situation at Crestwood, the overall financial situation has not changed much due to the drastic decline in revenues allocated to the school from farmland assessments. The district receives approximately $800,000.00 dollars in state aid money and approximately $1,000,000.00 in local revenues with which to operate the school. The district's weighted average daily attendance is approximately 996.00. Approximately twelve point four percent (12.4%) of its overall student population are eligible for federally sponsored Chapter I programs (Regional Superintendent's Statistics, 1988). In addition, the state recently added Crestwood to its list of schools on its financial "watch list." "The district had been on very stable financial ground until the depreciation of farmland in the early 1980's" (Zuber, 1988). This status is not surprising given the current state of farmland values and reassessments in Illinois.

Statement of The Problem

The importance of the usages (or non-usages) of textbooks as a medium of learning and as a primary instrument in the school's curricular materials, and instructional practices is considered to be important in the context of this study, and as documented by leading researchers, such as Goodlad and Armbruster. Issues concerning the adoption of new textbooks could include

many factors related to the new textbooks such as (a) the readability levels, (b) the cost, (c) the adoption policies/ processes, (d) their problems associated with ironing out any difficulties during the first full year's use, (e) the testing or evaluation procedures which may need to be changed as textbooks are changed, (f) the actual textbook content coverage, and (g) the differences in how the texts are used (or not used) among different teachers. Although these issues are certainly relevant and important in the context of this field experience, they are secondary issues to the primary problem which this paper addresses.

This field experience paper examines whether the switch from the Holt, Rinehart and Winston science textbook series to the new Prentice-Hall science textbook series had any noticeable effects on student achievement.

It specifically seeks to determine what effects, if any, resulted from the new science textbook program by Prentice-Hall being used at Crestwood Elementary School, Paris, Illinois, on science achievement test scores and on science grades earned by students.

Limitations of The Study

There are several limiting factors involved in this particular field study. There are some variables which may have been present in this study which the writer could not control. These include but are not limited

to: differences in (a) teacher behaviors, (b) trait instabilities among teachers, students, and administrators, or any other similar conditions, such as The Hawthorne Effect, (i.e., the writer assumed that this study did not induce those involved to respond or provide information any differently than they would have provided were they not being studied) which could leave the results of this field study ill-defined or relatively inconclusive.

Additional limitations include limiting the entire targeted student population of this study to students who attended Crestwood Elementary School in (c) the sixth grade and who also attended in the eighth grade at Crestwood in 1987-1988 or in 1988-1989. The reason for these limits is that test and grade data prior to the years for these two groups is scanty and only marginally available. Additionally, those students in (d) the sample population who did not meet the attendance criteria outlined later in this chapter were eliminated from both the experimental and control groups. Student achievement, in the context of this study, was limited to grades earned, and the Normal Curve Equivalents achieved on the students' exams.

The writer made several assumptions within the context of this field experience. The writer assumed that all collected data was accurate (student's test

scores and related data were acquired second-hand due to confidentiality of student's test scores).

The writer assumed that there may be skill differences that could not be controlled among the three teachers involved that could be potentially significant in their bearing or potential bearing on the outcome(s) of this field study. The writer also assumed that the Science Research Associates standardized tests, given every mid-April at Crestwood Elementary School, are reliable, valid, and non-biased. The writer also assumed that the 1988-1989 eighth grade class was not much different or statistically exceptional in any regard which would make this study's results unusual or dramatically different, than if done with previous eighth grade classes from Crestwood.

Definition of Terms

In an effort to provide the reader of this paper with as much clarity as is possible, the following terms are explicitly defined:

Standardized Test. In this field study The Science Research Associates' Achievement Test. This test is generally accepted in the field as is reliable, valid, and non-biased (culturally or otherwise), and based on a representative sample and norm-group.

New Science Texts. The Prentice-Hall, Inc., 1988 series of science texts, workbooks, study guides, teacher's manuals, and the like, which were in their first full year of usage at Crestwood Elementary School in the 1988-1989 school year.

Crestwood's Science Teachers. The three science teachers at Crestwood Elementary School. All three of these teachers have had instructional contact with the student population involved in this study. The three junior high level science instructors at Crestwood are Mr. Wayne Berry, Mr. Steven Bailey and Ms. Paula O'Bryan.

Student Population. The experimental population of students involved in this study are 1988-1989 eighth graders and the control population consists of 1987-1988 eighth graders. Those members of the population who also attended Crestwood Elementary as sixth graders and the required criteria of attendance at Crestwood and in the science classes.

Required Attendance Criteria. (a) The student must have completed both his/her entire sixth and eighth grade school years at Crestwood, (b) the student must not have missed more than ten days of any grading period for any reason whether legitimate or otherwise, (c) the student must not have missed more

than ten science class periods in any one grading period, (d) the student must not have been placed in another instructional environment even if he/she was not considered absent (i.e., internal suspension), and, (e) the student must not have suffered any extensive disruptions in his/her attendance of science classes due to extra-curricular participation such as athletics, student clubs or other recreational activities, or undergone extensive changes in his/her academic program such as participation in a pull-out program, or being reassigned or mainstreamed and then placed back in a special education setting.

Student Achievement. Students' performance levels in science as measured by their NCE's on the Science Research Associates, standardized achievement test, and as measured by the letter grades they receive in their science classes, at Crestwood Elementary School.

Chapter II

Rationale, Related Literature and Research

Rationale

Textbooks play a dominant role in the curriculum of most schools. The pervasive and almost domineering influence of textbooks have been well noted and documented.

Goodlad (1984) stated that:

> One must conclude that the supply and variety of instructional materials available in the elementary classrooms were exceedingly limited. The selection of the questionnaire requesting information from teachers regarding materials beyond textbooks was in some instances completely blank. A few teachers a small percentage of the whole - sent us self-made materials of relatively high quality. But textbooks dominated. (p. 215)

Goodlad also found that "The textbook predominated throughout as a medium of instruction, except in kindergarten. With each advance in grade level, dependence on the textbook increased" (Goodlad, 1976, p. 14). A Study in Texas concluded that students spend 75 percent of their classroom time and 90 percent of their homework time using textbooks and related materials (Educational Products Information Exchange, 1974).

Powell and Garcia (1985) contend that "Textbooks are an integral part of instruction. Only occasionally do classroom deliberations extend beyond the boundaries established by textbook authors" (p. 519). Leonard (1987) states that "There is little debate that the reading of textbooks is a dominant learning mode in American education" (p. 27). Osborn, Jones, and Stein (1985) assert that "Because published textbook programs are so pervasive in American schools and because they often in effect, constitute a curriculum, it seems important for educators to raise some questions about these programs" (p. 9). Yager and Penick (1983) found "the supremacy of the textbook to be the most serious limit on science learning" (p. 68). The heavy-reliance on textbooks within elementary science and in American education, in general, abound throughout the literature.

Review of the Literature

Text Readability, Writing and Organizational Patterns.

Ferris et.al. (1984) concurred with Risner (1987) in their reviews of various texts that poor text organization and structuring often neglected student's use of higher order thinking skills. Scruggs (1988) concurred with Hurd (1982) that a middle-level science textbook can often contain or introduce as many as 2,500 new technical terms. For comparison, a typical foreign language course will

usually only contain half that number. Scruggs found that the multitude of technical terms plus the fact that science texts (particularly at the elementary level) often lack close matches with students cognitive levels/abilities, tended to turn students off to science. Scruggs also concurred with Hurd (1982) who felt that more importance needed to be given to the selection, adoption and implementation processes of middle-level science texts.

Warming and Baber (1980) have developed a twenty-item inventory guide to be used in conjunction with either the Raygor or Fry readability tools. They claim their system offers much improvement over most other textbook selection methods and covers the necessary touchstones of the textbook selection process as well.

Livingston (1989) found that students benefited from having a wide variety of science texts and materials to choose from. This forced students to read a wide variety of material at different levels of reading difficulty.

Armbruster, Osborn and Davison (1985) reported shaky statistical bases for using readability formulas. They contend that different readability test or formulas (a) often vary widely when used on the exact same passage, (b) often vary widely when used with different sections of the same text, (c) often fail or have yet to be determined to be effective in predicting how their intended readers

will be able to comprehend the text, and (d) often cause textbook writers to rewrite texts in a manner which becomes even more difficult to comprehend/understand.

Armbruster (1984) found that the prose in many elementary level science and social studies texts may be turning off children to these subjects at an early age. Armbruster also found that the inaccuracies in many texts may be the result of deliberate pedagogical, political, or philosophical compromises made to keep a wide-appeal for the sake of profits, to appease certain interest groups, or simple carelessness.

Armbruster also noted that the ease by which an adoption committee will yield faith in a readability index or formula is often ill-founded, and not without consequences. Armbruster encourages adoption committees to pressure publishers to produce texts designed for specific grade levels.

Tyson-Bernstein (1987) found that readability formulas often substitute as a style-manual for publishers weary of losing market-share. The author also contends that selection committees can influence this process to the betterment of school children, by using seasoned school teachers in place of such formulas to rid the process of heavy-reliance on readability formulas, as well as

the not-so easy to read prose which is a result of such methods.

Gwyn (1987) found that students read science textbooks most effectively when done aloud and in conjunction with other approaches such as outlining sections of the text. Peer support/feedback, and providing an environment where weak readers are safe from ridicule were also found to be crucial.

Ekwall and Milson (1980) noted several strategies to combat the frequent mismatch which occurs between the reading abilities of students and their instructional materials. They found the following alternative strategies most useful (a) using picture vocabulary representations of the written material, (b) using a highlighter to note the most important sections of the text, (c) using student written summaries of text material, (d) tape recording the text material, and (e) using an appointed a committee of students to survey upcoming chapters of the text for difficult sections, or unfamiliar words/concepts.

Armbruster (1984 and 1985) and Armbruster and Anderson (1988) noted the lack of coherence in many texts. Coherence exists in three areas. First, there is global coherence, which refers to the coherence of the whole text. Then, there is local coherence, which refers to coherence at the level of individual units, paragraphs

or chapters. Finally, a text which has coherence in these two critical areas is said to have achieved textual coherence. Also noteworthy is the importance of signaling in texts. Signaling methods include (a) using enumerated lists in text material, (b) using informative headings, (c) using boldface and italic type settings, and (d) using prose which clearly lets the relationships between ideas and the most important ideas/concepts of the text be readily apparent to readers.

Armbruster and Anderson also mention the ironic nature of readability formulas, as actually making texts less readable in the long run. They note the general inability of most texts to effectively and clearly denote their most explicit and important ideas and concepts. They confirm (a) the lack of pilot or field testing of textbooks considered for adoption, (b) the gross lack of time and financial resources available for more rigorous methods of text evaluation and selection, (c) the inability of many adoption committee members to assume the perspective of those for which they are choosing texts, and (d) the lack of ability by many to reject such incoherent and "inconsiderate texts" (p. 48), which only further encourages their continued production and distribution.

Rubin (1985) has noted that, given current knowledge and research in reading and cognitive psychology, readability formulas, which may have been justifiable in preceding decades, now constitute a verible technological dinosaur.

MacGinitie (1985) emphasizes the idea that most classes have way too wide a variation in the levels of student abilities for the typical narrow focus of texts and related materials. MacGinitie contends that no single or even multiple set(s) of instructional materials can accommodate the wide range of ability found in today's typical classroom. As a result, the best readers the worst readers in most classrooms end up using inappropriate materials. MacGinitie also contends that more varied and ability specific materials, coupled with more teacher help for students, will go a long way to remedy this situation.

MacGinitie also shares Rubin's distaste for readability formulas by noting that they often lead to writing which takes concern for vocabulary used and sentence/word length limits well above concern for "careful, logical and communicative writing" (p. 83). MacGinitie observes that writing in such a manner will often lead to an oversimplified expression of important ideas and/or concepts.

Holliday (198) also recommends not using readability formulas as he feels they are not useful, reliable, or even valid. And in terms of text usages, he recommends that all students, especially poor readers, be shown how to "(a) determine how chapters are organized, (b) recognize the most important ideas and concepts, (c) tell how the most important ideas and concepts relate to other subordinate ideas and concepts, (d) tell how figures, drawings and tables relate to the text, and (e) to use the learning aids within the text" (p. 5).

Text Content and Text Improvement. Osborn, Jones and Stein (1985) have found most commercially produced texts to be lacking in the areas (a) of implementing reading research such as schema or metacognition theories, (b) of having coherent text structures, (c) of having clear patterns of text organization, (d) of not having any confusing or hard to follow text lines or story lines, (e) of clear sequential ordering, (f) of having any actual field testing with strategies designed to help the actual readers of such texts, (g) of helping readers to recall and comprehend what they have written, (h) of providing considerateness via text structure and coherence, (i) of providing sufficient feedback and correctives, (j) of assurance as to its readability, (k) of providing sensible graphics, (l) of content unity, (m) of assurances of

audience appropriateness, and (n) of relevant vocabulary by which to promote, better student understanding. They also note that publisher's economic interests may slow the incorporation of such factors into a given text, unless they are specifically requested by their customers.

Tyson-Bernstein (1988) believes that a growing part of the problem of textbooks and their poor quality stems from a vast inertia amongst those in academia to criticize or evaluate the efficacy of such texts, apart from merely signing-on their names as contributors. Although this particular article deals primarily with college-level texts, Tyson-Bernstein delineates several problems common to college and K-12 level texts such as topic glut, unnecessary mentioning, term mongering, name dropping, and confusing prose. Tyson-Bernstein also denotes the fundamental problem as being the lack of an authoritative and feasible sequence for learning the tasks in each discipline.

Tyson-Bernstein (1985) noted an emerging trend whereby cognitive experts on instructional design are beginning to have an impact on text publishers, and are beginning to build a case that better texts will produce gains in student achievement. This seems to be most true at the elementary levels where the text can often dominate the entire curricular thrust.

Tyson-Bernstein (1985) noted the problem of mentioning in textbooks. This occurs when a textbook publisher mentions nearly every conceivable topic in a discipline, and as a result is able to give each one only topical and superficial coverage. Suggestions for improvement include publishers only writing books for the topics which are desired in a given market area or giving teachers who sit on textbook adoption committees more power in determining the knowledge base/content in their areas of expertise and within the texts they deem to be appropriate.

Tyson-Bernstein (1988) discusses the problems of readability formulas, the publishing and state system adoption politics, economic factors which seem to take precedence over educational/student concerns, the problems of "inconsiderateness" in texts, and the trend of textbook publishers to emphasize testable skills, often at the expense of content.

Elliot and Nagel (1986) found that many texts were sufficient in terms of their content, but they neither promoted scientific thinking nor pushed students to the necessary cognitive levels required to understand most of the existing content.

Lerner and Bennetta (1988) note that most life science textbooks do not treat scientific theories very well. This often serves to confuse students as to the

important distinctions between theories, facts, hypotheses, and myths. Goldstein (1978) determined that the four central areas of instructional technology; consumer behaviors, producer behaviors, and federal and state subsidies for textbook purchases; have effectively acted to "discourage the production and use of innovative materials" (p. 2).

Text Usages Within the Science Curriculum. Woodbury (1979) notes that texts are indeed our primary source of conveying curricular content, although less than one-percent of school funds is spent on them. Woodbury noted that, in several school media resource studies, teachers have ranked textbooks as the least desirable source of instructional media, although they readily confirm that texts were used the most often. Woodbury also found that, due to the large amounts of money, time and effort devoted to the development of school texts by publishers, many texts were already out-of-date upon their actual arrival into the classroom. Belserene (1987) found that not being required to use a textbook in science classes brought a new sense of motivation to teaching, and also forced students to approach science from a more hands-on approach. Also noted were generally improved grades, freedom from the restrictions of a text driven

curriculum, and the ability for teachers to choose the most teachable labs and supporting materials.

In the area of text usages, the Association for Supervision and Curriculum Development (1985) found that many districts run into the pitfalls of (a) not having a system for implementing the newly adopted texts, (b) not monitoring the new texts/programs after they are initially installed, and (c) not having a system for the continual modification and updating of newly adopted textbooks throughout their lifetime.

Elliot and Nagel (1987) found that in their investigation of nine major science textbook series, that although they cover content well, these texts do not encourage the development of scientific thinking amongst students. They assert that textbooks artificially narrow the curriculum to the pursuit of the known. They also noted that many of the more innovative science programs of the 1960's and 1970s, such as the Science Curriculum Improvement Study, Science - A Process Approach, and the Elementary Science Study, were never widely adopted, due to lack of commercial success. They suggest (a) resequencing of textbooks for more discovery and hands-on learning, (b) purchasing units of the more innovative programs of the 1960's and 70's and incorporating these into traditional text-based programs, and (c) incorporating

more divergent and open-ended science activities for students, to balance out the curriculum against traditional textbook/workbook activities which tend to be rather predictable.

Holliday (1984) found a lack of emphasis given to reading within the science curriculum. Holliday believes that the lack of willingness amongst researchers to study such issues within science education results in reading being used infrequently (if at all) in science classrooms, and science teachers and researchers ill-informed as to how to improve this situation. Students were also found to be ill-informed as to how to make the best use of their science instructional materials.

Porter et.al., (1979) found that, after texts were actually implemented, many teachers based their content decisions on the content that they found in textbooks or other related instructional materials. Pressures for them to change their subject-area content were driven by tests, test-results and local learner objectives, not by adopted textbooks.

DeHurd (1986) focused on the changing nature of science education; the changing culture of the sciences, science education, the cognitive sciences, science teachers and research; and his belief that textbooks should not be viewed as a means to all ends. DeHurd also asserts that

science education is not in sync with current society. To get in sync, DeHurd maintains that science educators should shift to a science, technology and society emphasis; modernize and update curricula accordingly; and maintain better linkages with curriculum researchers, scientists, and cognitive psychologists.

Yager and Penick (1983) noted:

> The supremacy of the textbook is the most serious limit on science learning. The textbook seems to determine course content, mode of instruction, evaluation and ultimately what students do or do not learn. Thus, the major curriculum decision that U.S. teachers make is to choose a textbook. Once determined teachers complain about the choice while still attempting to cover all the content in the book chosen, usually in the same order and with the same instructional aids as the text suggests. (p. 68)

Stake (1978) noted that the traditional science curriculum "exists as the facts and concepts that are traditionally packaged in textbooks. The textbook not only determines the content, but the order, the examples, and the application of that content" (p. 5). Also found was little if any general acceptance for teaching science as inquiry and that science, as taught at the elementary level, used primarily recitation with occasional labs

which merely demonstrate material already presented, or serve to break-up the monotony. Stake noted (a) no one-single textbook could not possibly provide for all local conditions and circumstances, (b) that some teachers may use the neat conceptual packaging of the textbooks as a means to avoid some of the untidy realities of science, and (c) that teachers even though they generally seem open to suggestions in terms of pedagogy and instructional matters, often end-up clinging to the comfort and safety of a science curriculum with text-driven guidelines and parameters.

Gega (1980) noted that the end result of the innovative science programs of the 1960's and 1970's (i.e., SCIS, SAPA, and ESS) may have been to improve and build-up the appeal of more orthodox textbooks. He recommends that school districts not abandon their local needs merely to comply with some ready made curriculum materials. The solution is to choose the text which best fits with local district needs and use this as only a base into which materials deemed useful; given local needs, circumstances and resources, can be integrated as needed and appropriate.

Gega also emphasizes the necessity of a district-wide needs assessment which thoroughly involves teachers, administrators, and all relevant support and central office staff, if a process such as he is suggesting is to be

successful. Iona (1981) noted out and out inconsistencies and blatant errors and false information in the way many teacher's editions instruct teachers to guide students during demonstrations and classroom observations. Yager and Stodghill (1979) noted the tendency for science programs which are too text driven to limit and narrow the curricular possibilities by only focusing on what is already accepted as given knowledge in science, thereby ignoring the realities of what knowledges are yet unknowable or ill-defined.

Yager (1987) notes the need for science teachers to modernize and make science much more relevant for their students by the use of societal issues as organizers. Yager proposes this type of curriculum as a means of dealing with the traditional textbook dominated curriculums. Yager also advocates such an approach as a means of stimulating inquiry, problem-solving, and higher order thinking capacities with students.

Eisner (1987) highlighted the four primary ways in which textbooks are enabled to influence the curriculum. These are:

> First, the fact that the textbook, with its accompanying materials (i.e., workbooks), represents the curricular hub around which much of which is taught revolves. Second, that the texts and related

> materials organize content around topics that usually have some logic: in other words, the task of sequencing material for educational purposes is largely done--or at least believed to have been done. Third, the textbook provides both teachers and pupils with a kind of security [sic] it lays out the journey that students and teachers will take [sic] one knows what follows what and where it all ends. The coverage of this content becomes important because implicit in the textbook is the idea that if children do not cover all of the material they are being cheated. Fourth, the textbook, which usually has a teacher's version, gives teachers the questions they should ask students, provides test items they can use, suggests activities students can engage in, and provides teachers with the correct answers. (p. 11)

Gilbert (1984) notes that lab texts often do not approach the ideal of inquiry or of process-oriented learning. Gilbert asserts that this is due to the fact that the labs are seen as an outgrowth of the text, and not as an independent and distinct learning experience for students. Also found was that textbook lab experiments, with their ready-made and predictable outcomes, often neglect the proper emphasis of investigation necessary

to a truly scientific attitude. Gilbert suggests a model-lab approach whereby experiments come to closure, but are not necessarily tied to rigid expected outcomes, as is the case in many standardized science textbooks.

Mittlefehldt (1985) also emphasizes over-reliance on traditional science textbooks. Mittlefehldt also states that "such regimentation suggests to the students that only the authorities know the right answers, and worse, that all the answers are known. This is how science becomes not only intimidating but rigid and unproductive" (p. 68). Mittlefehldt suggests that students in elementary science be given more investigative assignments and not be merely instructed to follow chapter after chapter out of a textbook.

Swetz (1986) hypothesizes that old and previously used science textbooks can be examined to establish changes needed to be made in activities for students which address changing societal issues and problems as well as the changes in knowledge claims within the discipline over preceding years past. Students can then examine and compare/contrast such books to obtain a sense of perspective on the changing nature of both inquiry and history as an inquiry type activity.

Blosser (1986) suggests that much more research is necessary to determine the overall effectiveness of science

texts. Blosser also suggests that, in the near future, research be performed comparing text-dominated classrooms to those classrooms which use no text at all.

Gega (1982) suggests that traditional text-driven programs can be modified into district science programs which meet local needs/objectives. Four specific approaches to these are:

> The Correlated Resource Approach which simply prepared a printed supplement that correlates present district or school resources with text units. The Chapter Approach which pulls out the major concepts and performance objectives of the necessary chapters involved. The Lesson Approach involves breaking science text chapters down into specific lessons with each one featuring one idea or objective, and the Generalization Approach which generalizes the main ideas of each textbook unit. (p. 29-30)

However, Gega does not intend to imply that local needs should not be the starting point of all curricular decisions.

Text Selection/Adoption Systems and Implementation. Talmage (1986) suggests that, in the textbook selection process, publishers, teachers, scholars, and interpreters of scholarship, must have clearly defined roles for the best possible outcome. Talmage particularly notes and

encourages the publishers to assume their vital role as risk-takers, with the ability to resist faddism, and pressure group politics, for the sake of preserving the disciplines for which they publish with integrity and honesty. Maeroff (1982) notes much pressure on some textbook publishers to give way to a specific view of evolution, for the sake of profit.

Holliday (1984) presented a research-based sequential manner by which to approach the selection and usage of science texts. Major questions to be answered under this approach include the following:

> (a) are the diagrams, drawings, tables and graphs . . . directly related to the printed text?, (b) are the concepts and processes presented in a meaningful and integrated fashion?, (c) are cues and clues and variations, such as boldface type and other methods employed to cue and highlight important ideas and concepts for students?, (d) are the illustrations effective with summaries/glossaries and other aids to student learning, and are the sentences of a reasonable length and complexity?, (e) are study questions and other organizers used which will help to promote student understanding/learning, and (f) are the directions for labs and student projects clear? (p. 5)

Holliday suggests that good textbooks have "many concrete, explicit, examples, simplified 'barebones' explanations, consistent patterns of organization amongst and within chapters, content compatible with students prior knowledge and skills, and the absence of clutter, tangential ideas, unnecessary modifiers and meaningless jargon" (p. 5).

Moyer and Mayer (1985) list ten primary criteria by which to select science textbooks. They are as follows:

> (a) Basic concepts and principles of science are covered in a well ordered synthesis; and the book is more than a storehouse of facts, (b) The coverage of science is modern, accurate and linked to the cumulative store of relevant concepts from the past, (c) The point of view is forward-looking, opening vast, vistas of previously unanswered questions, (d) New terms are properly defined, meaningful, and used several times, (e) The development of concepts builds from simple to complex as a logical sequence, (f) Study questions, when provided, are intellectually challenging and trigger more than a regurgitation of facts, (g) A scientific theory is treated as an explanation of a major phenomenon of nature encompassing a broad range of observations, (h) The conclusions of science are backed with evidence

> and not presented as mere opinions or beliefs, (i) Scientific methods are accurately described and used in presenting the work of scientists, (j) Scientific knowledge is neither eliminated nor muted in response to parochial pressures. (p. 7)

However, they readily admit that such terms as forward looking, in criteria (c) above, will promote some subjectivity into the process as different individuals define these terms differently.

They discount all possibilities of vast improvements in the general lot of mass produced elementary level science texts until such time as a consensus amongst educators/scientists/specialists and the general public can be reached in regards to the appropriate content(s)/ knowledge bases for science texts.

DeSilva (1986) list four reasons for which the outlook for great improvements in the area of textbooks is rather pessimistic:

> (a) First is that, the school book market place is so complex that (previous) efforts to change it are likely to fail or have unexpected negative results, (b) Second is that, publishers are unwilling to take the first step because the cost of producing new books is enormously high. Publishers cannot afford the risk of publishing better books that might not

> sell, (c) Third is that, schools books are relied on to do too much, and until their role is altered, it will be difficult to produce good ones, (d) Fourth is that, educators, who should be demanding that publishers produce better books, often are unaware of the seriousness of the school book quality problem. (p. 9)

DeSilva also asserts that the solution(s) to improving the quality of school books will be found at the demand level, if publishers desire for profits are tied to greater accountability and higher quality standards. DeSilva also criticized adoption committees in general for not taking their tasks seriously enough by focusing on irrelevant or marginal considerations such as price, illustrations, marketing slogans, or the personality of their district's sales representatives.

The American Federation of Teachers (1988) outlined some of the more political processes by which publishing representatives crawl and dive over one another to get on state approved lists in those states which have state-level adoption systems, complete with numerical rankings. The article also highlighted the numerous variables (i.e., readability, cost, rank, profit, research results, state/ legislative criterias, etc.) which are involved in the current state of textbook adoption, in the United States.

Doyle (1984) affirms his position that textbook publishers are not unresponsive to the passing whims and fancies of the markets they serve, but way too responsive to such demands. This in turn is what causes textbook standards to plummet, and stay down. Also highlighting this is the fact that several texts have begun to purge Darwin from their pages as a means of acquiescing to local/regional statutes/beliefs. Doyle also asserts that, although on its surface textbook adoption seems to be a relatively simple process, it is in reality horrendously political and complex in nature. These complexities, coupled with publisher's ready-made senses of accommodation, lead to texts which attempt to be all things to all readers, and fail everyone in the process. Doyle states:

> That selection of textbooks by committee leads to a lowest common denominator should itself be no surprise then as each offending book is weeded out, the remaining books get progressively more bland. Textbook publishers know this and design books precisely with this in mind. But a textbook that is written to be all things to all people cannot satisfy the discerning reader. (p. 12)

Doyle also goes on to assert, as have Goodlad (1984) and Boyer (1983), that the teachers, who will be using the textbooks on a daily basis, ought have the greatest (if

not the entire) amount of say-so in the textbook selection process. Also noted was the authors disdain for what he felt was the continual "dumbing" (p. 13) of U.S. textbooks.

Farr & Tulley (1985) also confirm the vast and pervasive influence which textbooks have in the classroom. They keenly highlight the political buck passing which often occurs between publishers, state wide textbook adoption committees, and local textbook adoption committees, when questions of text quality and effectiveness arise. The publishers claim they have no choice but to produce the books which these committees want. The committees claim they would select better books if only they were available.

Farr & Tulley also highlight the fact that relatively little is known about the actual workings of either state-wide or local level textbook adoption committees. They also document the lack of pilot text testing, or field-testing of texts in the classroom, and the overt political nature of text adoption. "Committee members are taken to dinners, special textbook presentation sessions are held at vacation resorts, and special favors are provided to committee members in the form of trips to professional conventions and the like" (p. 470). They concluded by highlighting the five factors which doctoral study at Indiana University found to be greatest in influencing

adoption committee members. The five factors were (a) the publishers, (b) the results of pilot tryouts, (c) the politics/personalities of the people involved, (d) the actual processes used in or by the committee and its members, and (e) the pedagogy, and educational factors.

Additionally, Farr & Tulley issued six distinct recommendations for all textbook adoptions:

1. Textbook adoption committees must recognize that selecting a textbook is not the same as selecting a curriculum,
2. Textbook adoption committees should focus their attention on those factors that are most likely to identify effective textbooks,
3. Once the list of criteria is established, committee members should review examples of each criteria,
4. All evaluation procedures to be used in textbook adoption should be tried out and revised before the actual review is conducted,
5. Committee members should be given time to learn about the review process, to develop valid and reliable evaluation procedures, and to actually review the textbooks, and
6. Textbook adoption should take place at the level of the local district or school. (p. 471)

They also noted a disproportionate share of influence among states that have state-wide textbook adoption systems, as compared to states that do not have state-wide textbook adoption systems. Texas and California most notably, have enormous influence even in the actual content of textbooks via the economic pressures they can wield with the larger textbook publishers.

Kirst (1984) detailed his experiences as the State Board of Education President in California. Kirst is still unsure as to whether or not a closed state-wide run text adoption, is better than open selections made at the district or individual-school levels. Kirst also noted that the emphasis still tends to be focused on print size, appearances, and pedagogy, rather than on text content. Another problem was that insufficient time and renumeration was given to those expected to do the tiresome task of reviewing and comparing texts and associated materials.

Kirst noted problems with (a) the text publishers being afraid to stray from the market's mainstream for fear of incurring economic losses, (b) the texts themselves which often were not linked to state-wide or local curricular goals, (c) the profound lack of texts matched to explicit standards for a given grade level, (d) the flack received from publishers on California's

decision to narrow it's approved list to just eight selections, (e) the lack of training and selection criteria for those doing the selecting, (f) the oversimplified criteria or factors such as readability, and (g) the general malaise in the area of textbooks selections/ adoptions.

Moyer (1985) noted the enormous influence that the state of Texas has in determining the actual content of textbooks (particularly in science/biology and history texts), due to the powerful purse-strings it can hold out to major U.S. publishers. Moyer then cites two common examples in which those in Texas proceeded to use such clout (a) by changing statements regarding Darwinism from a fact to mere theories, and (b) by deleting or eliminating all references to sexually transmitted or venereal diseases from health and biology texts.

Talmage (1985) developed an entire schema for selecting instructional materials. Two fundamental aspects to this approach are: that all personnel, district-wide, be given and use the same language to prevent misunderstandings and that the district's needs come first as a means of selecting instructional materials. Talmage asserts that these two steps, if used properly, can prevent the textbook from becoming the entire curriculum at the level of individual classrooms. Muther (1984) provides specific

questions and guidelines which should be asked into by those state or district-level personnel considering the adoption of textbooks. These questions fall into the following categories: durability, case of use, authorship research base, field testing and implementation support.

Muther (1985a) also highlights the market forces and other conditions, such as readability, which influence the eventual products which publishers eventually produce. Muther also firmly maintains that local textbook adopters must have a clear sense of their district's local needs if the textbook adoption process is to be successful.

The Association For Supervision And Curriculum Development (ASCD, 1985) found that less than one percent of a typical school's budget is spent on textbooks despite their overwhelming influence on the curriculum. In its video tape on textbook adoptions, it emphasized the following factors as potential pitfalls which are to be avoided in terms of people (a) that an inadequate number of people are often involved in the process, (b) that those involved have not been trained or taught in textbook evaluation, and (c) that those elected to leadership positions within these committees often do not take strong leadership positions.

In terms of the books themselves, the ASCD found that many committees (a) often evaluate the sizzle rather than

the steak, that is do not pay enough attention to core content materials, (b) often are not well versed in current research concerning the texts they propose to adopt, (c) often get hung up on finding the perfect text, (d) often do not know what it is they want or need in a given text or subject-matter area, (e) often have not studied their current texts, (f) often have not determined the role the text will play in their local curriculum, (g) often do not know what they expect in a text, or (h) often have not even performed a local needs assessment in regards to their text adoption policies.

Tyson-Bernstein (1988) offers several suggestions for policymakers in adoption states which include:

> Ceasing the practice of issuing detailed, skill-oriented bid specifications to publishers, abandoning the use of readability formulas, stop demanding a recent publication date, the appointment of people to adoption committees on the basis of their knowledges and talents--and not only on the basis of their geographic location, institutional roles, or organizational affiliations, provide substantive training for adoption committee members, pay or reward teachers who serve on such committees, eliminate long generic checklists, write books or guidelines based on their curricular or testing objectives and contract

> with a single, reputable publishing house, devise meaningful sanctions against state or local school personnel who accept free editions or other extras, the establishment and implementation of new subject specific policies and a framework for curriculum review and textbook selection with two central objectives: selecting books on the basis of qualities that are known to benefit students, and rewarding publishers who produce such books, and allocating state funds for textbook purchases at the local levels, and earmarking some of the funds for the development of an enhanced selection process. (p. 26)

Tyson-Bernstein's recommendations for policymakers in non-adoption states include "to encourage by their purchasing practices the more venturesome and less expensive offerings of small publishers, use of tradebooks and original source materials, and to otherwise exercise the freedom they have" (p. 26).

English (1980) also noted the tendency for the textbook to monopolize the available curriculum within the classroom. Furthermore, English contends that those supposedly charged with finding factual errors in state-wide textbooks selected for potential adoption, often merely substituted their own biases and/or idiosyncrasies for content which they find objectionable. English also claims to have

seen the wining and dining and other assorted politics associated with the textbook publishing industry. English also documents the blandness which results when publishers attempt to please everybody.

Text Publishing/Suggestions. Tyson-Bernstein (1988) suggests that national academic organizations of teachers and professors in the various disciplines do the following. "Define a coherent curriculum (or a series of such) which can be taught in the times allotted, discourage the practice of being listed as an author and accepting royalties or fees for texts they did not actually write, and develop model contracts for those who do write such texts which retain the author's right to control subsequent editions" (p. 27).

Tyson-Bernstein also suggests that national teacher's unions do the following. "Through through their local affiliates organize content-specific textbook study groups, promote alternative methods for judging the reading level(s) of a textbook, and as the textbook reform movement unfolds, press for more teacher control over textbook selection" (p. 27). Tyson-Bernstein proposes that foundations support independent critical reviews of textbooks and general circulation magazines and newspapers" (p. 27). Finally, Tyson-Bernstein proposes that:

> Publishers should employ true subject matter scholars --as opposed to public school teachers or education professors to review textbook content for factual accuracy, conceptual integrity, and value, hire authors who have demonstrated their ability to write clear and engaging text for mass audiences, write or select good material first, then figure out how to use that material to foster vocabulary growth, test achievement, and critical thinking, and become more realistic about the time it takes to produce a good book. (p. 27)

Komoski (1985) reports that laziness on the part of local administrators and state department of education personnel has lead to the current state of affairs. Komoski determined that texts and related materials constitute a de facto license for curriculum and instructional design from the schools to publishing houses and outside developers rather than to teachers, and other in-house experts. Komoski contends that this, coupled with the fact that the eventual consumers of the texts (kids) are entirely removed from the purchasing process, has lead us to the current craziness in the textbook market.

Additionally, Komoski highlights other relevant factors such as (a) the fact that the phenomenon of

blandness in many textbooks forces many districts to use substandard materials, (b) the phenomenon of standardized and formulastic writing due to readability formulas, (c) the texts which cover nothing in depth and everything topically due to too wide a content focus, (d) the gross lack of texts and related instructional materials for differential and special learners, (e) the poor purchasing decisions on the part of many an administrator and/or teacher, (f) the general lack of piloting or field testing in regards to instructional materials, (g) the lack of involvement by informed teachers in the process, and (h) the fact that while textbooks as a dominant and ready-made curriculum may have been viable/excusable for the rapid growth modes of the mid-nineteenth century, they are ill-suited for our current state of educational, economic, and technological progress.

Usage of Text Research. Muther (1985) noted that teacher unawareness or lack of knowledge about current educational research, and how such could be potentially implemented at the classroom level, contributes to the tendency of textbook publisher's not to stray too far from the middle of their markets. Muther also noted a general omission on the part of most school districts to obtain and use research when making such a decision.

Review of Related Research

Although the writer did not find any research studies which were highly similar to his field experience study, much of general relevance was found.

Text Organization/Patterns/Usages. Horak (1985) in his meta-analysis of 40 studies dealing with science text comprehension found that the strategies of helping students to select the most crucial information, and those helping students to spot and structure phrases or words which make important internal connections within the text, produced noticeable gains in the levels of students' comprehension. Hickey (1984) analyzed the relationship between achievement and the structure of textbooks in a junior high science class involving both regular and special needs students. Results showed that both groups made achievement gains when restructuring of text material occurred, and that both groups tended to lose such gains when returning to the previous text structure. Also highlighted was the importance of proper placement of special needs students, the importance of content and methodology within the instructional process, and budgetary considerations involved in investigating the effects of new text structures.

Roth et.al. (1986) found that students generally have great difficulty in learning basic and critical concepts

from their science texts/materials. In this particular study of three elementary level science classrooms, Roth concluded that a conceptual change strategy which consisted of verbally responding to student's questions in terms of student areas and real-life situations promoted much more effective student learning and text usage then merely responding to student questions and misconceptions by using the textbook. Roth also concluded, from this particular study, that eliminating the textbook entirely was not a feasible option for most science teachers.

Scruggs (1988) found, based on Shayer and Adey's research in England, that most science texts don't closely match the Piagetian cognitive levels of the students for which they are written. Scruggs contends that a better match must be made if science education is to be improved.

Davey (1988) found, via questionnaires that elementary level teachers tended to give more emphasis to textbook reading, reviewing text selections with students, using different texts/materials with different students, and changing texts if students had difficulty in reading them. Also of significance were the findings that elementary teachers found more time to preview text passages which were to be used in class, and that wide ranges in the levels of student abilities often made the texts relatively useless. Risner (1989) noted, in the study of five major

elementary science texts, that many end of chapter study guides and objectives did not challenge students to use their higher order thinking skills, and that teachers often use such materials as a primary means of evaluating student performance.

Hamrick and Harty (1987) found, in their study of 203 sixth-grade science students, that a general resequencing of science texts, designed to both clarify content and establish interrelationships amongst major concepts, led to (a) more positive attitudes towards science, (b) more interest in science, and (c) more higher levels of science achievement as compared to students who did not experience texts where content had been resequenced.

Leonard (1987) found that the location in which questions were presented in the text, at the beginning or end of major paragraphs, had a significant effect on exam scores amongst 425 university students. Leonard concluded that questions inserted at the beginning of major paragraphs produced significant gains in comprehension of text materials.

Hinchman (1987) studied three content area teachers at the secondary level. The three teachers were then asked to explain, in both written and verbal formats, the actual content they had taught from the texts while independent evaluators evaluated the actual content being used from the

textbooks. In all three cases substantial discrepancies were noted. These discrepancies often confuse students.

Heller (1984) conducted a state-wide survey in Minnesota regarding various aspects of science education, including textbook and program uses. Heller found that lecture/discussions using the text as a major content and instructional source were by far the most common instructional methodology. Heller also found, via a teacher survey that most teachers prefer to stay with the textbook that they are currently using.

Hilder and Rice (1986) analyzed the differences in attitudes towards science classes of selected fifth and sixth grade students based on a variety of instructional modes geared toward the right hemisphere, the left hemisphere, or the use of both hemispheres in the processing of various elementary level science lessons dealing with electricity. They concluded that left hemisphere-oriented modes of instruction using a textbook approach resulted in the greatest achievement gains but also in the lowest gains in the improvement of student attitudes towards science.

Yore (1987) noted that all science texts tended to be thought of more favorably when direct instruction in reading was also provided to students. This resulted in greater science achievement levels for all of the

54 elementary level students within his study. This instructional strategy tended to equalize pre-treatment reading differentials amongst students and improve reading levels for all students. The author noted a slightly greater increase in reading in the area of science by females over that noted for males.

Text Adoption/Selection/Criterion Issues. Orlich (1985) found that the exercise of choosing science texts in a wide variety of districts tended to limit the actual science curriculum to the areas and breadth of coverage found in the selected texts.

The California State Department of Education (1986) developed a guide to assist its school districts in the selection and acquisition of elementary level science texts and materials. Various categories within this document were content coverage, teaching and learning activities, the organization of texts and topics, ancillary materials, teacher materials, text goals, readability, facilitation of higher-order thinking skills, and appeal to students. This document was designed based on past research and is available for districts to use as a supplemental resource for choosing texts which already appear on the approved list in the State of California.

Hungerford and Tomera (1985) developed a system to analyze and modify how science texts get used in the

classroom using the following major criteria (a) by comparing the books goals to goal-clusters as outlined and funded through the National Science Foundation, (b) by modifying the approaches used to assure that at least some of the project clusters are covered, and that they facilitate scientific literacy regardless of the text(s) used, (c) by explaining the district's own science goals/objectives/focuses before selecting a textbook program, (d) by explaining the various differences between various textbook programs (i.e., inductive vs. deductive emphases), (e) by the citing of or listing of a district's desires/needs in a teacher's guide/edition within a given text series, (f) by describing, delineating, and defending the characteristics of the ideal text for your elementary school(s), and, on the basis of your own textbook analysis developing a chart which lays out both the strengths and weaknesses of your proposed elementary science textbooks, (g) by defending your particular selection's strengths and/or weaknesses.

Additionally, they also suggest several flaws which occur with most textbooks such as the fact that (a) many texts don't keep up with science issues which are currently important to society, (b) many texts don't recommend ways in which they can be infused to use science across the entire curriculum, they don't promote general literacy,

(c) many texts don't promote scientific literacy, (d) many texts don't often incorporate well with local needs and programs, (e) many texts often overemphasize concepts at the expense of processes, and (f) many texts often supply teachers with a ready-made set of limitations rather than encouraging them and their students to explore alternative possibilities.

Elliot and Nagel (1987) found that most texts selected for use in U.S. schools tended to be rather rigid, rote, and overly formula-based, leaving students with little emphasis on scientific inquiry and with little opportunity to apply what they have learned from such texts to practical real-life situations.

Good and Shymansky (1986) in their massive study of text reviews/selections/and adoption patterns found the two most frequently used models of selection were high-inference models, which are very subjective and judgemental, and low-inference models, which are less subjective and judgemental.

Good and Shymansky (1986) surveyed all 50 states as to their required/recommended science text adoption/ selection/implementation forms and concluded:

(a) that very little emphasis is given to problem-solving in the forms used by most textbook adoption committees, (b) that few states use science textbook

adoption forms which are designed specifically for specific grade level groupings, (c) that instructions on the usage of textbook appraisal instruments might (ideally) include example results generated by "experts", (d) that as state science frameworks become more specific, in terms of course content, tying textbook adoption standards to these frameworks could have a considerable "influence" on the eventual content of the textbooks, (e) that science "process" skills are not often given much prominence in textbook evaluation forms, (f) that clear, thoughtful descriptions of the philosophies, and goals, of science education where the exception rather than the "rule" for most states, (g) that the importance of the laboratory as an integral part of the science curriculum is given little attention in most textbook appraisal forms, and (h) that there is little evidence, (from this research, at least), that research on such things as: comprehension of text material, misconceptions, wait-time, and learning within groups was used to construct relevant items for textbook appraisal forms. (p. 17-20)

Text and Content Issues in Science Curriculum. Gabel, et.al. (1986) surveyed 553 elementary science teachers nationwide to see what areas of science teaching

could or perhaps should be researched by professional researchers to help these teachers in areas of their greatest interest. Gabel found the top ten research interests to be: "hands-on experience for students, science content in the curriculum, cognitive development and learning styles, problem-solving in science, general teaching strategies, the teaching of gifted students, the sequencing of science content, effective printed materials, and pupil attitudes" (p. 12). Although the general acceptance of the text as a primary force in the curriculum was not challenged, textbooks per se were barely mentioned, by those teachers who were surveyed, as an important research interest, in and of themselves.

Kyle, et.al. (1986) analyzed the differences between the attitudes of students and teachers in the Science Curriculum Improvement Study, versus those who were not involved in any such improvement plan. This was done in response to legislation in Texas requiring that science be taught in an inquiry-oriented process-approach, which was also to be reflected in selected textbooks. A major premise of this study was that a significant portion of previous studies used texts from the 1960's, and that current texts were assumed to be more advanced in their levels of general effectiveness. Kyle concluded that students overwhelmingly preferred the new process-

oriented and inquiry-oriented approaches and materials and that previous methods and materials often tended to be too text-driven.

DeBlasi and Sousa (1984) sent over 2,000 questionnaires to various New Jersey elementary, middle, and junior high schools, in regards to various issues regarding science instruction including type and specific textbook used and the methods used by each school to update its' textbooks (if any). The major findings were that text-centered programs emphasizing both inquiry and discovery methods, were the most dominant forms of instruction at the Kindergarten through eighth grade levels, and that all texts and related materials should be updated/replaced/modified, at least once every five to six years.

Vachon and Haney (1983) developed a schema or classification system which analyzed the concepts in an eighth grade science text and organized and evaluated them along lines of Piagetian developmental stages. They found that those middle school students working with the science text they analyzed, would be expected to utilize a "considerable amount of formal reasoning" (p. 244).

Meyer, Crummey and Greer (1988) analyzed the content domains of four major elementary science texts and found that differences amongst texts, while being evident, were

not dramatic. None of the texts analyzed were found to be grossly inconsiderate, although all of the surveyed texts seemed to have a good number of potentially problematic technical terms and differed noticeably in the coverage they gave various content areas. They also found that the texts/programs with the greatest amount of content also had the highest percentages of teacher-directed activities. They did not hazard an opinion as to which text series (if any) could be considered as the most effective or most considerate, amongst the four which they reviewed. They did however, note that the general levels of text inconsiderateness which they expected to find did not prevail.

Reading/Text Strategies. Davey (1988) studied 60 good and 60 poor readers to see if allowing them to look-back to the text during a question-answer period had effects upon their reading tactics and strategies. Also studied were the type of errors and frequency of errors amongst both groups. Davey found that, while poor readers generally committed more errors, the overall error rates were generally stable. Poor readers were less adept at answering those questions requiring text-based knowledges. This was attributed to the finding that they made fewer attempts to locate such information than good readers did.

Finley (1983) analyzed the responses and recall patterns of 38 physics students after their readings of a portion of a science text to determine their recall of selected propositions. Although all students recalled some propositions, all of which were quite coherent, none of the four groups of students recalled propositions which were related to the main idea or theme of the passage they read. He concludes that educators cannot assume that all or even a majority of students will recall or extract the same or even similar information from the same passage(s) of text.

Garner, Chou-Hare, Alexander, Haynes & Winograd (1984) investigated the effects of using a text lookback strategy upon 12 remedial readers. They found that when the lookback strategy was used by these 12 students regularly, they outperformed the control group in their ability to use lookbacks and in answering questions from the text accurately.

Field (1982) examined the effects of elementary science textbook readability levels on the science achievement scores of elementary students with low, average, and high-level reading abilities. Field found that student gains in both reading achievement and science achievement scores progressed upward when students read texts and tests with readability levels at or near the

reading levels. Students were negatively affected if either the text or test exceeded their estimated reading ability.

Montgomery (1985) studied the relationships between five state-approved elementary level science texts in Texas and the publisher's estimates of their readability levels, versus readability levels as determined by the Fry readability graph, the Dale-Chall readability formula, the cloze technique, student judgment and teacher judgment. It was discovered that significant relationships existed between teacher's judgements and the Fry readability graph, and not with the Dale-Chall formula, or student performances on the cloze technique with the different textbooks. Teacher experience did not aid in estimating the readability levels as measured by either the Fry or Dale-Chall measures.

It was also found that the Fry readability graph was the most accurate measure of readability as compared with student judgements, and that further studies will be necessary due to poor levels of performance on the cloze technique and Dale-Chall formula, in regards to science textbooks.

Literature/Research Summary

As a convenience to readers of this paper, a summary of the major findings from both the literature and research

sections is provided. This summary synthesizes the major findings into ten primary areas of concern in regard to textbooks. After each statement citations are provided from sources cited within this document.

The major findings from both the literature and research sections of this paper are as follows:

1. In many cases, texts as an instructional medium are relied upon too heavily, and often in effect form an entire curriculum in and of themselves. This limits and narrows the existing curriculum and blinds those involved in implementing the curriculum to other possibilities. Goodlad (1976, 1984), Osborn, Jones & Stein (1985), Leonard (1987), Talmage (1985), and MacGinitie (1985).

2. Readability formulas are too heavily relied upon, and are often statistically shaky in regards to their validity and reliability. These same formulas may actually lessen the overall readability of a text, as publishing houses may then alter their writer's styles to fit a particular readability level, and produce writing which is confusing to the reader. Armbruster (1985), Armbruster & Anderson (1988), Armbruster, Osborn, & Davison (1985), Tyson-Bernstein (1988), and Rubin (1985).

3. The textbooks themselves are often ineffective, in several ways such as the lack of: signaling mechanisms within the text, advance organizers to help students organize and prioritize content, indications that the text is being considerate of the skill levels of it's intended audience, attempts to keep content down to the essentials, attempts to make sure the content flows smoothly and makes sense to it's intended audience, attempts to reduce the levels of bad prose evident in some texts, and attempts to proofread the texts to ensure their accuracy both in content and in grammatical/writing styles. Armbruster (1985), Armbruster & Anderson (1988), Armbruster (1984), Ekwall & Wilson (1980), Holliday (1984), Iona (1981), MacGinitie (1985), Muther (1984, 1985), Tyson-Bernstein (1985), and Tyson-Bernstein (1987).

4. Local needs and goals regarding what expectations a particular school and or district hold, for their instructional materials, have not been taken into account or been well defined. This also includes the local district's or school's needs assessment regarding instructional materials as well as its own adoption/ implementation/review processes. Hurd (1982), Yager & Penick (1983), Gega (1980), Gega (1982), Moyer and Mayer (1985), Doyle (1984), Farr and Tulley (1985), Talmage (1985), Muther (1985a), The ASCD (1985), English

(1980), Hungerford & Tomera (1985), and Good & Shymansky (1986).

5. The texts and/or their publishers are slow to incorporate the latest research from the academic discipline covered in the text, findings on the most effective ways to reorganize text content, reading research, cognitive psychology, and human growth and development. Ferris (1984), Risner (1987), Scruggs (1988), Hurd (1982), Rubin (1985), Osborn, Jones, & Stein (1985), Tyson-Bernstein (1985), Blosser (1986), Muther (1985), Horak (1985), Hamrick & Harty (1987), Leonard (1987), Hilder & Rick (1986), Yore (1987), Hungerford & Tomera (1985), Elliot & Nagel (1987), Meyer, Crummey & Greer (1988), and Davey (1988).

6. The chosen textbook series was not field-tested in the actual school(s)/district(s). Both the literature and the research identified this as a major concern. Yager & Penick (1983), Armbruster & Anderson (1988), Osborn, Jones & Stein (1985), Farr & Tulley (1985), Talmage (1985), Muther (1984), Komoski (1985), The ASCD (1985), and The California State Department of Education (1986).

7. In many cases, text organization, usage and actual implementation, at the classroom level, was adversely affected by existing controversies in the

science curriculum. Controversies occurred in the actual topics or pedagogical methods presented to students, or in what was considered to be an appropriate knowledge base for science students of a particular grade level. Elliot & Nagel (1986), Lerner & Bennetta (1988), Elliot & Nagel (1987), Holliday (1984), Stake (1978), Yager (1987), Gilbert (1984), Mittlefehldt (1985), Moyer (1985), Hinchman (1987), Gabel et.al. (1986), and Kyle et.al. (1986).

8. Teachers and other district personnel are often not current on related textbook research. This research often suggests several strategies whereby teachers can make an unsuitable text or other instructional materials effective in their classrooms. Gwyn (1987), Ekwall & Milson (1980), Holliday (1984), Osborn, Jones & Stein (1985), Davey (1988), Finley (1983), and Garner, Chou-Hare, Alexander, and Haynes & Winograde (1984).

9. Textbooks and other instructional materials are often not well aligned in regards to their fit with existing curricular materials. In this situation, the textbook series has not been evaluated in regard to the larger curricular picture. In such a situation a mismatch often occurs between the textbook series and: classroom, local building-level, and/or districtlevel objectives, state goals and/or objectives, and testing and evaluation

instruments. Woodbury (1979), The ASCD (1985), Holliday (1984), Porter et.al., (1979), Gega (1980), Gega (1982), Farr & Tulley (1985), Talmage (1985), Muther (1984 & 1985a), The ASCD (1985), and Tyson-Bernstein (1988).

10. The current status of the textbook industry makes it difficult to produce better, and more effective texts. This includes the enormous amount of influence of several of the larger statewide adoption committees, the economic influence of the larger adoption states such as Texas and California, the impact of federal and statewide monies/grants which are allocated for the purchase of texts and other instructional materials, copyright laws, and the fact that the eventual consumers of many (if not all) of the educational textbooks, sold in the U.S., are isolated from being able to exert their own economic pressures or articulate their own needs for instructional materials, which are supposedly designed for them. Talmage (1986), Maeroff (1982), Holliday (1984), DeSilva (1986), The AFT (1988), Doyle (1984), Goodlad (1984), Boyer (1983), Farr & Tulley (1985), Kirst (1984), Moyer (1985), Muther (185a), Tyson-Benrstein (1988), English (1980), Tyson-Bernstein (1988), Good & Shymansky (1986), and Komoski (1985).

11. Often, at the level of a school district or at the individual building-level, the textbook selection,

adoption, and review process is underestimated as to the amount of time, expense, and human resources/expertise needed to do a thorough job. This, of course, varies from district to district and school to school but, in any case, realistic and achievable decisions need to be made in these areas for the overall process to be successful. Armbruster (1984), Armbruster & Anderson (1988), Tyson-Bernstein, (1988), The ASCD (1985), Stake (1978), Talmage (1986), DeSilva (1986), Doyle (1984), Farr & Tulley (1985) Kirst (1984), Talmage (1985), Komoski (1985), The California State Department of Education (1986), Hungerford & Tomera (1985), Good & Shymansky (1986) and DeBlasi & Sousa (1984).

12. At the building and classroom levels, better means of reviewing and evaluating texts which are already in use must be developed. This includes the use of publisher provided follow-up services, and the ability of individual schools and/or districts (especially those of smaller size) to articulate to major publishing houses what they would like to see in future editions of a text, in an organized fashion. Armbruster (1984), Osborn, Jones & Stein (1985), Tyson-Bernstein (1985), Tyson-Bernstein (1988), The ASCD (1985), Porter et.al., (1979), Talmage (1986), DeSilva (1986), Doyle (1984), Farr & Tulley

(1985), Muther (1984), Tyson-Bernstein (1988), Hungerford & Tomera (1985), DeBlasi & Sousa (1984).

Chapter III

Design of The Study

General Design of The Study

This is a field experiment study in which there was no control over variables other than the science textbook used for instruction in eighth grade. The general design of the study is that of control and experimental groups, pre and post test. The control group of students used the same textbook during both their sixth and eighth grade years. The experimental group used the same text as the control group in sixth grade but used the new science text in eighth grade. The NCE's and grades for both groups of students' in their sixth grade year were treated as the pre-test data. NCE's and grades in the students' eighth grade year were treated as post-test data. Baseline data from pretests established that both groups were equivalent, in all relevant aspects, prior to the experimental manipulation of the eighth grade text.

Hypotheses

The hypotheses under examination is that the new textbook series will yield statistically significant increases in student achievement in science. Thus, statistically significant increases in both science achievement test scores and in science grades earned are expected.

The independent variable in this study is the new Prentice-Hall, Inc. science textbook series. The dependent variables in this study were the letter grades received by the individual students, and the student's performances on the SRA standardized test, as measured in Normal Curve Equivalents (NCE's). Effects were determined by grades earned and the normal curve equivalents (NCE's) attained on the Science Research Associates Standardized Science Tests by the group of students who have experienced being instructed using the new textbooks (experimental group) and those of the group of students who were not using the new science texts (control group).

Teacher opinions and student opinions are also considered in this study. These were obtained through Likert type surveys, and pertain to various aspects about how teachers and the current eighth grade students used and felt about their new textbooks. These data are included in the study as supporting information and not as measures of student achievement.

Sample and Population

The subjects were chosen to be representative of the student population at Crestwood Elementary School, Paris, Illinois. The classes studied were all students from the 1987-88 and 1988-89 eighth grade classes, who met the designated criteria. Subjects included those who

attended Crestwood Elementary School as sixth and eighth grade students, and who met the specific attendance criteria described in Chapter I. The population studied contained 116 subjects. The control group (Class of 1987-88) consisted of 67 students. The experimental group (Class of 1988-89) consisted of 49 students. The reason a larger sample was not used was the limited availability of letter grade data for prior year's students at Crestwood Elementary School. All science teachers involved with the students were selected to receive and respond to the teacher questionnaire.

Data Collection and Instrumentation

Data for this study was collected in one of two ways. First, the NCE's, from the SRA standardized tests, and letter grades were retrieved for the writer by Alan Zuber, the building level principal at Crestwood, and by other internal building level staff members. This data was then used to compile inferential statistics to make comparisons of the performances of both groups as sixth and as eighth graders.

Descriptive data was obtained from teacher and student questionnaires and compiled by the writer. Both the teacher and the student questionnaires were written and developed by the writer. These information gathering instruments are assumed to be reliable and valid on the

basis of face and content validity, and on the basis of construct validity.

The teacher survey, (See Appendix A) a five point Likert-type instrument, and the student survey, (See Appendix B) also a five point Likert-type instrument, were both analyzed and charted on the percentages of particular responses.

Survey Sample Questions

Examples (one each) From Teacher's and Student's Text Survey.

Teacher Question #16 I do not regularly use the texts as a reference in the context of lecture/discussion type instruction.

Strongly Agree Agree Undecided Disagree Strongly Disagree

Student Question #3 I have difficulty understanding my new science textbooks.

Strongly Agree Agree Undecided Disagree Strongly Disagree

Any clear trends or patterns of responses were noted. The teacher survey was distributed in March of 1989. The student survey was distributed in May of 1989, when this year's eighth grade class had been using the newly adopted texts for nearly a full school year. Student letter-grade

data was collected for this years' class as soon as it was available in mid-June. Student letter-grade data for last year's eighth grade was collected earlier. The author converted the standardized testing data into NCE's.

Data Analysis

The data and or information in this study was analyzed in different ways. Upon completion of the data collection process, t-tests for non-independent means were computed for both the pre and post scores of the NCE's and the student letter grades. The level of significance of differences between means was pre-set at .05.

The survey results from the student and teacher surveys were analyzed and significant trends, findings conclusions and/or patterns of responses, are reported in Chapter IV. All computations and inferential statistical analyses were performed by the computer center of Eastern Illinois University, Charleston, Illinois. The SPSS-X statistical software package was used to compute t test results. All analyses of descriptive data were performed by compiling the student and teacher survey responses directly from the surveys.

Chapter IV

Results

Data Analysis of NCE's and Grades

Non-Independent t tests were performed on both the NCE's and letter grades of the control group as sixth and eighth graders, and on the experimental group as sixth and eighth graders. The number of cases was 67 in the control group and 49 in the experimental group. The degrees of freedom for the control group was 66, and 48 for the experimental group.

The statistical analysis of the NCE's and earned grades of both groups are shown on Table 1, page 71. It was found that the mean NCE for the experimental group was significantly higher after the treatment. The mean NCE scores of the control group were not found to be statistically significant. Mean grades were lower in the eighth grade in both the experimental and control group.

Based on the data presented in Table 1, the hypothesis, that the new science text would result in significant achievement gains as measured by the SRA Science Achievement Test, is accepted. The hypothesis that the new texts would result in higher grades earned in science is rejected.

Table 1

NCE And Grade Data As Analyzed By Non-Independent t Tests.

Variable	NCE 6th Gr. Pre-Control	NCE 8th Gr. Post-Control	NCE 6th Gr. Pre-Exp	NCE 8th Gr. Post-Exp	Grades 6th Gr. Pre-Control	Grades 8th Gr. Post-Control	Grades 6th Gr. Pre-Exp	Grades 8th Gr. Post-Exp
# of Cases	67	67	49	49	67	67	49	49
Mean	62.14	64.68	61.55	66.89	2.70	2.47	2.81	2.57
SD	18.53	19.87	16.16	16.13	1.05	1.19	1.13	1.06
Standard Error	2.26	2.42	2.31	2.30	.129	.146	.162	.152
Mean Difference	2.53		5.34		-.23		-.24	
SD	13.09		14.32		.85		.72	
Standard Error	1.59		2.04		.104		.103	
t Values	1.59		2.61		-2.16		-2.37	
(df)	66		48		66		48	
1-Tailed Test	.058		.006		NA		NA	

Teacher Survey

Since all three participating science teachers completed and returned surveys, a return/response rate of 100% was achieved. Each individual survey question result is reported by percentage of responses by category. A separate table is used to report the results of the teacher survey questionnaire for each individual question. Numerical percentages are supplied for each possible response category for each individual question. General conclusions and any other comments and/or concerns are contained within this chapter.

Table 2

Like/Dislike Texts.

Teacher Question #1 I like the new science texts.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	2	--	--	--
	(33%)	(67%)	--	--	--

Results: Based on the data found in Table #2, the science teachers at Crestwood like the new science texts.

Note: All figures for all Tables are rounded off to arrive at a total percentage of (100%).

Table 3

Like/Dislike Texts.

Teacher Question #2 I do not like the new science texts.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	2	1
	--	--	--	(67%)	(33%)

Result: Based on the data found in Table #3, the science teachers at Crestwood Elementary overwhelmingly like the new science texts.

Table 4

Science Texts/Classroom Activities.

Teacher Question #3 I have no difficulty in incorporating the new science texts into my classroom activities.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	2	1	--	--	--
	(67%)	(33%)	--	--	--

Results: Based on the data found in Table #4, the science teachers at Crestwood have little or no difficulty in incorporating the new science texts, into their daily classroom activities.

Table 5

Science Texts/Classroom Activities.

Teacher Question #4 I have difficulty in incorporating the new science texts into my classroom activities.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	2	1
	--	--	--	(67%)	(33%)

Results: Based on the data found in Table #5, the science teachers at Crestwood have little or no difficulty in incorporating the new science texts into their daily classroom activities.

Table 6

Regular Use of New Science Texts.

Teacher Question #5 I use the new science texts regularly with my students.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	2	--	--	--
	(33%)	(67%)	--	--	--

Results: Based on the data found in Table #6, it would appear that the new science texts are used regularly by the science teachers at Crestwood.

Table 7

Regular Use of New Science Texts.

Teacher Question #6 I do not use the new science texts regularly with my students.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	2	1
	--	--	--	(67%)	(33%)

Results: Based on the data found in Table #7, it would appear that the science teachers at Crestwood are using the next science text regularly, with their students.

Table 8

New Science Texts/Learner Objectives.

Teacher Question #7 I base my classroom learner objectives on the learning objectives in the new science texts.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	1	2	--	--
	--	(33%)	(67%)	--	--

Results: Based on the data found in Table #8, it would appear that a majority of the science teachers at Crestwood, are undecided as to what role (if any) the new text/series will play in the formulation of their classroom level learning objectives.

Table 9

New Science Texts/Learner Objectives.

Teacher Question #8 I do not base my classroom learner objectives on the learning objectives in the new science texts.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	2	1	--
	--	--	(67%)	(33%)	--

Results: Based on the data found in Table #9, it would also seem to concur with Table #8, in that the science teachers at Crestwood seem undecided as to what role (if any) the new science texts will play in the formulation of their classroom level, learner objectives.

Table 10

Classroom/District Objectives.

Teacher Question #9 I base my classroom learner objectives on our district learner objectives.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	1	2	--	--
	--	(33%)	(67%)	--	--

Results: Based on the data found in Table #10, it would appear that the science teachers at Crestwood, are undecided as to whether or not their district's objectives are used as a base by which to form their classroom-level learner objectives.

Table 11

Classroom/District Objectives.

Teacher Question #10 I do not base my classroom learner objectives on our district learner objectives.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	2	1	--
	--	--	(67%)	(33%)	--

Results: Based on the data found in Table #11, it would appear that the science teachers at Crestwood, are relatively undecided as to whether or not their district's objectives are used any more or any less or play an more of a significant role in the formulation of classroom learner objectives, than do the new texts.

Table 12

Lecture/Read From Text.

Teacher Question #11 I regularly lecture to my classes on material read from or taken out of the textbook.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	2	1	--	--
	--	(67%)	(33%)	--	--

Results: Based on the data found in Table #12, it would appear that the science teachers at Crestwood, are relatively undecided as to whether or not they use the new texts to lecture to their classes.

Table 13

Lecture/Read From Text.

Teacher Question #12 I do not regularly lecture to my classes on material read from or taken out of the textbook.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	1	2	--
	--	--	(33%)	(67%)	--

Results: Based on the data found in Table #13, it would appear that science teachers at Crestwood, are relatively undecided as to whether or not they use the new texts to lecture to their classes.

Table 14

Read Text/Class Discussion.

Teacher Question #13 I have students read selections out of the text and then discuss these, in class.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	2	--	1	--
	--	(67%)	--	(33%)	--

Results: Based on the data found in Table #14, it would appear that the majority of the science teachers at Crestwood have students read selections out of their texts, and then discuss these selections in class.

Table 15

Read Text/Class Discussion.

Teacher Question #14 I do not have student read selections out of the text and then discuss these in class.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	1	--	2	--
	--	(33%)	--	(67%)	--

Results: Based on the data found in Table #15, it would appear that the majority of science teachers at Crestwood do have students read selections out of the text and then discuss these in class.

Table 16

Text Reference/Lecture/Discussion.

Teacher Question #15 I regularly use the texts as a reference in the context of lecture/discussion type instruction.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	1	--	1	--
	(33%)	(33%)	--	(33%)	--

Results: Based on the data found in Table #16, it would appear that the science teachers at Crestwood show a wide degree of variation in regard to usage of the text in a lecture/discussion context.

Table 17

Text Reference/Lecture/Discussion.

Teacher Question #16 I do not regularly use the texts as a reference in the context of lecture/discussion type instruction.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	1	--	1	1
	--	(33%)	--	(33%)	(33%)

Results: Based on the data found in Table #17, the science teachers at Crestwood show a wide amount of variation in regard to their usage of texts as a reference in the context of lecture/discussion type instruction.

Table 18

Text/Student Reports.

Teacher Question #17 I use the text so that students can work on reports from text information individually or in groups.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	2	1
	--	--	--	(67%)	(33%)

Results: Based on the data found in Table #18, it would appear that the science teachers at Crestwood, do not use textual information for the basis of either individual or student group reports.

Table 19

Text/Student Reports.

Teacher Question #18 I do not use the text so that students can work on report from text information individually or in groups.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	2	--	--	--
	(33%)	(67%)	--	--	--

Results: Based on the data found in Table #19, it would appear that science teachers at Crestwood, overwhelmingly do not use the textual information to generate either individual or student group reports.

Table 20

Text/Library Work.

Teacher Question #19 I instruct students to use the text in the context of doing other library type work.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	1	2	--
	--	--	(33%)	(67%)	--

Results: Based on the data found in Table #20, it would appear that the science teachers at Crestwood generally do not instruct students to use the text in the context of other library type work.

Table 21

Text/Library Work.

Teacher Question #20 I do not instruct my students to use the text in the content of doing other library type work.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	2	1	--	--
	--	(67%)	(33%)	--	--

Results: Based on the data found in Table #21, it would appear that the science teachers at Crestwood, do not instruct their students to use their texts in the context of doing other library type work.

Table 22

Text/Charts Illustrations.

Teacher Question #21 I have students evaluate materials other than written passages in the text (charts, illustrations, diagrams, experiments).

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	2	--	--	--
	(33%)	(67%)	--	--	--

Results: Based on the data found in Table #22, it would appear that the science teachers at Crestwood do have students evaluate materials in the text other than written passages.

Table 23

Text Charts/Illustrations.

Teacher Question #22 I do not have students evaluate materials other than written passages in the text (charts, illustrations, diagrams, experiments).

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	2	1
	--	--	--	(67%)	(33%)

Results: Based on the data found in Table #23, it would appear that the science teachers at Crestwood, do encourage students to evaluate materials other than written passages in the text.

Table 24

Text/Inferences.

Teacher Question #23 I have students read passages in the text and make inferences from what they have read.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	2	1	--	--
	--	(67%)	(33%)	--	--

Results: Based on the data found in Table #24, it would appear that the science teachers at Crestwood, are generally in agreement on the practice of having students read selected passages from the text and make inferences from what they have read.

Table 25

Text/Inferences.

Teacher Question #24 I do not have students read passages in the text and make inferences from what they have read.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	1	2	--
	--	--	(33%)	(67%)	--

Results: Based on the data found in Table #25, it would appear that science teachers at Crestwood generally do have students read selected passages from the text and then make inferences from what they have read.

Table 26

Text/Study Guide Questions.

Teacher Question #25 I have student read passages from the text, and then they answer text or study guide provided questions.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	2	--	--	--
	(33%)	(67%)	--	--	--

Results: Based on the data found in Table #26, it would appear that the science teachers at Crestwood, do have students read from the text and answer text/study guide questions.

Table 27

Text/Study Guide Questions.

Teacher Question #26 I do not have student read passages from the text and they do not answer text or study guide provided questions.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	2	1
	--	--	--	(67%)	(33%)

Results: Based on the data found in Table #27, it would appear that the science teachers at Crestwood do generally instruct students by having them read passages from the text and then answer text/study guide provided questions.

Table 28

Lab Work From Text.

Teacher Question #27 Students are regularly assigned lab work or experiments which are derived from the text.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	1	1	1	--
	--	(33%)	(33%)	(33%)	--

Results: Based on the data found in Table #28, it would appear that there is no clear preference or consensus amongst the science teachers at Crestwood, as to whether or not students are regularly assigned lab work or experiments which are derived from the text.

Table 29

Lab Work From Text.

Teacher Question #28 Students are not regularly assigned lab work or experiments which are derived from the text.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	1	1	1	--
	--	(33%)	(33%)	(33%)	--

Results: Based on the data found in Table #29, it would appear that there remains no clear pattern or consensus as to how the science teachers at Crestwood, feel about having their students perform labs or experiments which are derived from the text.

Table 30

Test/Text Material.

Teacher Question #29 Students are regularly quizzed or tested based on material from the textbook.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	2	--	--	--
	(33%)	(67%)	--	--	--

Results: Based on the data found in Table #30, it would appear that science teachers at Crestwood, are regularly quizzing or testing their students from materials based in the textbook.

Table 31

Test/Text Material.

Teacher Question #30 Students are not regularly quizzed or tested based on material from the textbook.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	2	1
	--	--	--	(67%)	(33%)

Results: Based on the data found in Table #31, it would appear that the science teachers at Crestwood are regularly quizzing or testing their students, based on material from the textbook.

Table 32

Text/Higher Order Thinking Skills.

Teacher Question #31 Students are regularly given problems or assignments from the text which require higher order thinking skills such as synthesis or evaluation.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	3	--	--	--
	--	(100%)	--	--	--

Results: Based on data found in Table #32, it wouldappear that there is a consensus in that problems and assignments from the text given to the students to emphasize higher order thinking skills.

Table 33

Text/higher Order Thinking Skills.

Teacher Question #32 Students are not regularly given problems or assignments from the text which require higher order thinking skills such as synthesis or evaluation.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	3	--
	--	--	--	(100%)	--

Results: Based on data found in Table #33, it would appear that there is a consensus in that problems and assignments from the text given to the students do emphasize higher order thinking skills.

Table 34

Teacher Demonstrates With Text.

Teacher Question #33 I (the teacher), demonstrate various ideas, concepts, and knowledge to the students by using the text.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	3	--	--	--
	--	(100%)	--	--	--

Results: Based on the data found in Table #34, it would appear that the science teachers at Crestwood, do use the text to demonstrate ideas, concepts and subject-matter knowledge to their students.

Table 35

Teacher Demonstrates With Text.

Teacher Question #34 I (the teacher), do not demonstrate various ideas, concepts, and knowledge to the students by using the text.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	3	--
	--	--	--	(100%)	--

Results: Based on the data found in Table #35, it would appear that there is a consensus amongst the science teachers at Crestwood in regards to using the text as a means of demonstrating ideas, concepts and subject-matter knowledge to their students.

Table 36

Use Lecture/Discussion Frequently.

Teacher Question #35 I use lecture/discussion frequently.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	2	--	1	--	--
	(67%)	--	(33%)	--	--

Results: Based on the data in Table #36, it would appear that the majority of science teachers at Crestwood use lecture/discussion as a teaching mode frequently.

Table 37

Use Lecture/Discussion Frequently.

Teacher Question #36 I do not use lecture/discussion frequently.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	1	--	2
	--	--	(33%)	--	(67%)

Results: Based on the data in Table #37, it would appear that the majority of science teachers at Crestwood do use lecture/discussion frequently as a mode of instruction.

Table 38

Text as a Resource.

Teacher Question #37 I use the textbook solely as a resource.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	1	1	1	--
	--	(33%)	(33%)	(33%)	--

Results: Based on the data found in Table #38, it would appear that the science teachers at Crestwood, show a wide amount of variation as to whether or not they use the textbook solely as a resource.

Table 39

Text as a Resource.

Teacher Question #38 I do not use the textbook solely as a resource.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	1	1	1	--
	--	(33%)	(33%)	(33%)	--

Results: Based on the data found in Table #39, it would appear that the science teachers at Crestwood show a wide amount of variation as to whether or not they use the textbook solely as a resource.

Table 40

Text Used In Classroom Activities Often.

Teacher Question #39 I often use the textbook, as a part of my daily classroom activities.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	1	1	--	--
	(33%)	(33%)	(33%)	--	--

Results: Based on the data found in Table #40, it would appear that science teachers at Crestwood are not in any clear consensus as to whether or not they use the textbook often, as a part of their daily classroom activities.

Table 41

Text Used In Classroom Activities Often.

Teacher Question #40 I rarely use the textbook as a part of my daily classroom activities.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	1	1	1
	--	--	(33%)	(33%)	(33%)

Results: Based on the data found in Table #41, it would appear that science teachers at Crestwood are not in any clear agreement as to whether or not they use the textbook often, as a part of their daily classroom activities.

Table 42

Readings/Text.

Teacher Question #41 I often assign students readings with or without accompanying questions from the text.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	2	--	--	--
	(33%)	(67%)	--	--	--

Results: Based on the data found in Table #42, it appears that the science teachers at Crestwood do assign readings from the text often.

Table 43

Readings/Text.

Teacher Question #42 I do not often assign students readings with or without accompanying questions from the text.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	--	--	2	1
	--	--	--	(67%)	(33%)

Results: Based on the data found in Table #43, it appears that the science teachers at Crestwood do assign readings from the text often.

The science teachers at Crestwood generally differ in the ways in which they apply the textbook series in the classroom. Areas in which major differences existed and or results with little consensus included the following: whether or not the text would play any role in establishing learning objectives, whether or not to use the text solely as a resource, and the frequency of using the text amongst the three teachers, on a daily basis, in the classroom.

In spite of these differences, the teachers are in strong agreement that they: liked the new science text series, had little or no difficulty incorporating it into their classroom instructional activities, used

the texts regularly with their students, lectured and or used materials out of the text regularly in the classroom, and taught higherorder thinking skills.

Student Survey

The entire experimental group of students was administered the questionnaire in late April to determine how students felt about using the new science text series as compared to the previously used textbook series.

A separate Table reports the results of the student survey for each individual question. Numerical percentages are supplied for each possible response category for each individual question. General conclusions and other comments and/or concerns are included this chapter. Although there were 49 students in this class, only 41 were available on the day the questionnaire was administered.

Table 44

Enjoy New Texts.

Student Question #1 I enjoy my new science textbooks.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	2	18	20	1	--
	(5%)	(44%)	(48.5%)	(2.5%)	--

Results: Based on the data found in Table #44, the majority of students in Crestwood's eighth grade science class are yet undecided as to whether or not they enjoy their new science textbooks.

Table 45

Enjoy New Texts.

Student Question #2 I do not enjoy my new science textbooks.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	1	1	17	19	3
	(2.5%)	(2.5%)	(41%)	(47%)	(7%)

Results: When asked the corresponding question in a negative form, the majority now switched from undecided, to disagree, (47%). Based on the data found in Table #45, it appears that the majority of eighth grade students do enjoy their new science texts, although a sizeable percentage are yet undecided on this question.

Table 46

Difficulty Understanding New Texts.

Student Question #3 I have difficulty understanding my new science textbooks.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	6	8	24	3
	--	(14%)	(20%)	(59%)	(7%)

Results: Based on the data found in Table #46, it appears as though the majority of the eighth grade science students at Crestwood do not have difficulty in understanding their new science texts, although a sizeable portion of students are undecided on this questions.

Table 47

Difficulty Understanding New Texts.

Student Question #4 I do not have difficulty understanding my new science textbooks.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	4	17	9	8	3
	(10%)	(42%)	(21%)	(20%)	(7%)

Results: Based on the data found in Table #47, it would appear that the majority of eighth grade science students at Crestwood do not have difficulty in understanding their new science texts. A sizeable number express some difficulty/uncertainty in regards to understanding their new science texts.

Table 48

Teachers Often Use New Textbooks.

Student Question #5 My teachers often use the new science textbooks in my science class.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	12	18	2	6	3
	(30%)	(44%)	(5%)	(14%)	(7%)

Results: Based on the data found in Table #48, it appears that a strong majority of Crestwood's eighth grade science students perceive their teachers as using the science textbooks, often in their classes.

Table 49

Teachers Often Use New Textbooks.

Student Question #6 My teachers seldom use the new science textbooks in my science class.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	2	8	2	21	8
	(5%)	(20%)	(5%)	(50%)	(20%)

Results: Based on the data found in Table #49, it appears that a strong majority of the eighth grade science students at Crestwood, perceive their teachers as using the new science texts often.

Table 50

Science Book Hard To Read.

Student Question #7 My new science book is hard to read.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	--	2	5	23	11
	--	(4%)	(12%)	(56%)	(28%)

Results: Based on the data found in Table #50, it would appear that the eighth grade science students at Crestwood, generally do not find their new science textbooks hard to read.

Table 51

Science Book Hard To Read.

Student Question #8 My new science book is easy to read.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	12	19	9	1	--
	(30%)	(46%)	(22%)	(2%)	--

Results: Based on the data found in Table #51, it would appear that a strong majority of the eighth grade science students at Crestwood, find their new science textbooks easy to read. However, it should be noted that as compared to the percentage of students who responded as Undecided in Table #50 the percentage of students responding as undecided to this question nearly doubled.

Table 52

New Text vs. Old Text Readability.

Student Question #9 My new science textbook is easier to read and understand than my old science textbook.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	5	17	18	--	1
	(12%)	(42%)	(44%)	--	(2%)

Results: Based on the data found in Table #52, the eighth grade science students at Crestwood, feel their new science textbooks are easy or easier to read than the old textbooks.

Table 53

New Text vs. Old Text Readability.

Student Question #10 My new science textbook is more difficult to read and understand than my old science textbook.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Teachers	2	3	18	15	3
	(5%)	(7%)	(44%)	(37%)	(7%)

Results: Based on the data found in Table #53, the eighth grade science students at Crestwood, are largely undecided as to how their new science textbooks compare with the previously used textbooks, in regard to readability and their ability to understand their new textbooks. Additionally, although the majority of the students were undecided in their responses to this question, a sizeable number also felt that their new textbooks were perceived (by them) as being easier to read and understand.

In conclusion, the results of the student questionnaire indicate the eighth grade science students at Crestwood: (a) feel their new science textbooks are as easy or easier to read and understand than the previously used textbook series, (b) are split between liking and being undecided as to whether or not they enjoy their new science texts, and (c) are in agreement that their new science texts are not difficult to understand.

The current eighth grade class also found itself in overwhelming agreement on the subject of whether or not their teacher uses the textbook series often in the course of classroom instruction, with over two-thirds of the entire class responding that the text is used often in classroom instruction. On the subject of whether or not they perceived their new science texts as being hard to read, over two-thirds of the eighth grade students at Crestwood responded that their new science books were not hard to read.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary

This field study examined the textbook as well as textbook-related issues, practices, and problems, in a context of student achievement, in a field study setting. Two groups of students were studied in a control/ experimental pretest/post-test design to determine the impact/effects on the experimental group, which was the sole group of students receiving exposure to the independent variable.

The independent variable was the newly implemented science textbook series. The dependent variables in this study were the NCE's and the letter grades received by the students.

Descriptive data was gathered via two Likert-Type surveys. The first survey (Appendix A) was distributed to the three science teachers, involved in this study and examined the ways in which they applied and used the textbooks in their classrooms. The second survey (Appendix B) was distributed to 41 of the 49 students in the experimental group. This survey dealt with their feelings about their new science textbook series, on whether or not their teachers used these new texts frequently, and on whether or not they experienced

difficulties in reading and/or understanding their new texts.

The NCE's and letter grade data were analyzed via the use of t-tests. The SPSS-X statistical software package was used in computing this study's data. Computerized data analyses were performed at the Academic Computing Center, Eastern Illinois University, Charleston, Illinois.

Findings

Statistical findings are reported in Table #1 on page 71. The teacher survey questionnaire on text application suggested that the science teachers at Crestwood are in disagreement as to: whether they base their classroom learner objectives on content in the new texts, whether or not their district learner objectives are any more influential in determining their classroom level learner objectives, the best or most relevant ways to use the text in a classroom setting. They also disagreed and/or were undecided about whether or not they used lecture/ discussion often, and on whether or not the text was used often on a daily basis and on whether or not they considered themselves to use the new texts, solely as a resource, and were generally agreed upon in regard to assigning text readings to the students.

They agreed regarding the use of study guide or teacher's edition provided questions as a means of

evaluating students, agreed that they used the new texts regularly, agreed on the use of experiments/labs from the text for students, agreed that they regularly incorporate the new texts into their classroom activities, agreed on the importance of choosing text passages which encouraged students to use higher-order thinking skills, and agreed on the use of the text to demonstrate important ideas, concepts, or knowledges.

Major findings from the student survey were that the eighth grade science students at Crestwood generally liked their new science texts, (although a substantial portion of students (48.5%) were undecided on this question), the majority (64%) had little or no difficulty in understanding their new science textbooks, (although again, a substantial percentage of students (20%) responded "undecided", when asked if they had any difficulty in understanding their new science textbook series).

They also agreed that their science teachers used the new science textbooks series often in the classroom, (74%) and agreed that the majority of students (over 75%) felt that their new science textbook series was perceived as being <u>easy</u> to read. The students were generally undecided, (44%) (although the next largest percentage of responses [42%] "agreed"), when asked to decide whether or not their new science textbook series was perceived as

being any more or less difficult to read and/or understand than their "old" science textbooks.

Conclusions

The new text resulted in statistically significant gains in measured achievement. Although measured achievement went up in both the control and experimental groups, grades earned by both groups decreased significantly. Survey results demonstrated wide variations in the ways teachers used/implemented the new science textbook series, although all three teachers involved perceived themselves as using the new texts often in their classrooms. The student survey indicated generally positive responses to the new textbook series, however, substantial numbers of students were still undecided as to whether or not their new textbook series was difficult to understand or any more or less difficult to understand than their previous science textbook series.

Recommendations

Based on the data and results found in this study the following recommendations are made. These recommendations flow solely from the results found within this study.

First, it is recommended that the new science textbook program be retained as substantially higher SRA achievement test scores were obtained. Achievement as measured by SRA

achievement test scores increased in both the control and experimental groups.

Second, it is recommended that the science teachers and administration at Crestwood Elementary School conduct a thorough and detailed review of grading practices in the sixth, seventh, and eighth grades. Although the measured achievement (as measured by SRA achievement test scores) increased in both the control and experimental groups, achievement as measured in the form of student letter grades decreased. This resulted in substantial inconsistencies between the grades students actually received as compared with their levels of demonstrated achievement, as measured by SRA achievement tests.

Third, it is recommended that the junior high level science teachers and the administration at Crestwood begin a program of intensive staff development in regards to: science content, objectives, and teaching strategies. This would be directed at building a consensus in these areas and therefore, building a more coherent and coordinated science program. This recommendation flows from the finding that much variation exists between the three junior high science teachers, in regard to what is taught in their individual classrooms.

Fourth, it is recommended that the science teachers and the administration at Crestwood implement a field

testing program whereby, potential textbooks for classroom use could be field tested on Crestwood students. Major concerns would be readability, content issues, and general appropriateness for a given student audience. This would also give staff and administrators at Crestwood an additional source of data to consider prior to the selection of a given textbook series. This recommendation flows from the fact that large numbers of students at Crestwood are undecided as to whether or not they have difficulty in reading and understanding their new science textbook series.

Fifth, it is recommended that both the junior high level science teachers and the administration, at Crestwood, examine the extensive body of existing research on improving science teaching. This recommendation flows from an obvious need on the part of both the science teachers and the administration in better coordinating, articulating and delivering their locally agreed upon science objectives. A coordinated program of current and research based effective science teaching strategies, would go a long way towards meeting this crucial need.

Finally, it is recommended that both the faculty and administration at Crestwood begin the process of reexamining and revising their textbook selection criteria and processes. This recommendation flows from the

abundance of existing literature and research available in these areas. Potential areas of consideration might include: readability, developed systems of selection, textbook committee procedures and practices, and common pitfalls which are to be avoided during the adoption/ implementation process.

Further Research

First it is recommended that anyone performing further research in this topic area, should seriously consider devising a research design which examines more variables related to the textbook adoption/selection/ implementation process. As with any classroom environment, many potential variables exist. Future studies of this type will have to contend with this limitation.

Second, it is advised that any further researchers in this area use a situation with a large number of teachers.

Third, research studies of a similar nature should build in some actual field testing program for textbook series, and related instructional materials, based and evaluated on the needs of the school(s), and/or district(s), in question.

And lastly, it is recommended that future research examine school(s), or district(s), selection/ implementation practice(s) in regard to textbook series, and instructional materials in general. Two major

findings from the research/literature were that (a) the text still remains quite pervasive in it's overall impact on the curriculum and at the level of the individual classroom, and (b) that the decisions made at the points of textbook selection/adoption and actual implementation may be just as crucial as the ways in which texts are actually utilized in the classroom setting.

References

American Psychology Association. (1984). Publications Manual, Third Ed. Washington, DC.

Armbruster, B.B. & Anderson, T.H. (1988). On Selecting "Considerate Content Area Textbooks." Remedial and Special Education, 9(1), 47-51.

Armbruster, B.B. (1985). Content Area Textbooks: A Research Perspective. In J. Osborn, P.T. Wilson, & R.C. Anderson (Eds.), Reading Education: Foundations for a Literate America. (pp. 48-60). Lexington, MA: D.C. Heath and Co.

Ambruster, B.B., Osborn, J., & Davison, A.L. (1985). Readability Formulas May Be Dangerous To Your Textbooks. Educational Leadership, 42(7), 18-20.

Armbruster, B.B. (1984). How Is A Turtle Like A Frog? American Educator, 8(2), 14-17.

Armbruster, B.B. (1984). The Problem of "Inconsiderate Text." In G.G. Duffy, L.R. Roehler, & J. Mason (Eds.), Comprehension Instruction: Perspectives and Suggestions. (pp. 202-21). New York, NY: Longman Publishing Co.

Ary, D., Jacobs, L.C., & Razavieh, A. (1985). Introduction To Research in Education, Third Edition. New York, NY: Holt, Rinehart and Winston, Inc.

Bailey, S., Junior High Science Teacher, Crestwood Elementary School, Paris, Illinois. (personal communications, February 16, & April 4, 21, 1989)

Belserene, R. (1987). My Year Without a Textbook. The Science Teacher, 54(6), 61-2.

Bernstein, H.T. (1985). The New Politics of Textbook Adoption. Phi Delta Kappan, 66(7), 463-466.

Berry, W., Junior High Science Teacher, Crestwood Elementary School, Paris, Illinois. (personal communications, February 16, & April 4, 21, 1989)

Blosser, P.E. (1986). What Research Says...Improving Science Education. School Science and Mathematics, 86(7), 597-613.

Blosser, P.E. (1986). What Research Says...Research Related to Instructional Materials for Science. School Science and Mathematics, 86(6), 513-517.

Boyer, E.L. (1983). High School. New York, NY: Harper and Row Publishers.

Davey, B. (1988). The Nature of Response Errors for Good and Poor Readers When Permitted to Reinspect Text During Question-Answering. American Educational Research Journal, 25(3), 399-414.

Davey, B. (1988). How Do Classroom Teachers Use Their Textbooks? Journal of Reading, 31(1), 341-345.

De Blasi, R. & Sousa, D.A. (1984). A Survey of Science Teaching in The Elementary Schools of New Jersey 1983-84. New Jersey Science Supervisors Assn. (ERIC Document Reproduction Series No. ED 244 812).

De Silva, B. (1986). Better Textbooks? Dim Outlook Ahead. Curriculum Review, 26(2), 8-11.

Doyle, D.P. (1984). The "Unsacred Texts": Market Forces That Work Too Well. American Educator, 8(2), 8-13.

Eisner, E.W. (1987). Why The Textbook Influences Curriculum. Curriculum Review, 26(3), 11-13.

Elliot, D.L. & Nagel, K.C. (1987). School Science and the Pursuit of Knowledge - Deadends and All. Science and Children, 24(8), 9-12.

Elliot, D.L. & Nagel, K. (1986). Scientific Illiteracy In Elementary Science Textbook Programs. Paper Presented at The Annual Meeting of The American Educational Research Assn., San Francisco, CA. (ERIC Document Reproduction Series No ED 269 25).

Ekwall, E.E. & Milson, J.L. (1980). When Students Can't Read Textbooks And Lab Manuals. School Science And Mathematics, 80(2), 93-97.

English, R. (1980). The Politics of Textbook Adoption. Phi Delta Kappan, 62(4), 275-278.

Educational Products Information Exchange. (1974). Fits and Misfits: What You Should Know About Your Child's Learning Materials. Columbia MD: National Committee for Citizens in Education.

Farr, R. & Tulley, M.A. (1985). Do Adoption Committees Perpetuate Mediocre Textbooks? Phi Delta Kappan, 66(7), 467-471.

Ferris, P.J., et.al. (1988). Text Organization and Structure in Science Textbooks. Reading Horizons, 28(1), 12-18.

Field, M.H. (1982). Some Effects of Elementary Science Textbook Readability Levels on Science Achievement of Elementary Students With Low, Average, and High Reading Abilities. (Doctoral Dissertation, The University of Tennessee, 1982). Dissertation Abstracts International, 43 413-A.

Finley, F.N. (1983). Students' Recall From Science Text. Journal of Research in Science Teaching, 20(3), 247-259.

Gabel, D. et.al. (1986). Science Education Research Interests of Elementary Teachers. (ERIC Document Reproduction Series No ED 275 499).

Garner, R., Chou Hare, V., Alexander, P., Haynes, J., & Winograde, P. (1984). Inducing Use of a Text Lookback Strategy Among Unsuccessful Readers. American Educational Research Journal, 21(4), 789-98.

Gega, P.C. (1982). Convert Your Text Series into a District Science Program. Science and Children, 20(3), 28-30.

Gega, P.C. (1980). The Textbook Plus...Building a Better Science Program. The National Elementary Principal, 59(2), 44-49.

Gilbert, S. (1984). Model Labs: An Active Approach To Science Process Learning. Curriculum Review, 24(2), 75-77.

Goldstein, P. (1978). Changing The American Schoolbook: Law, Politics, and Technology. Lexington, MA: D.C. Heath and Co.

Goodlad, J.I. (1984). A Place Called School: Prospects For The Future. New York, NY: McGraw-Hill, Inc.

Good, R. & Shymansky, J.A. (1986). Issues Regarding The Establishment of Criteria for the Analysis and Selection of Science Textbooks. Paper presented at a Joint Meeting of the School Division Assn. of American Publishers, The National Assn. for Research in Science and Teaching and The National Council of Teachers of Mathematics, Atlanta, GA. (ERIC Document Reproduction Series No ED 267 987).

Gwyn, C. (1987). The Well-Read Textbook. The Science Teacher, 54(3), 38-40.

Hamrick, L. & Harty, H. Influence of Resequencing General Science Content on The Science Achievement, Attitudes Toward Science, and Interest in Science of Sixth Grade Students. Journal of Research in Science Teaching, 24(1), 15-25.

Heller, P. (1984). Minnesota Survey of Science Education. Minnesota State Department of Education, St. Paul, MN. (ERIC Document Reproduction Series No ED 259 882).

Hickey, M.C. (1984). Textbook Structure And Test Performance In Seventh Grade Science. (Doctoral Dissertation, Boston University, 1984). Dissertation Abstracts International, 45 1975-A.

Hilder, R.A. & Rice, D.R. (1986). A Comparison of Instructional Mode on The Attitude and Achievement of Fifth and Sixth Grade Students in Science. (ERIC Document Reproduction Series No ED 265 078).

Hinchman, K. (1987). The Textbook and Three Content-Area Teachers. Reading Research and Instruction, 26(4), 247-263.

Holliday, W.G. (1984). In Research Matters...To The Science Teacher. Howe, A. (Ed.) Buffalo, NY. (ERIC Document Reproduction Series No ED 273 489, Vol 2).

Holliday, W.G. (1984). Learning From Science Texts and Materials: Issues in Science Education Research. (ERIC Document Reproduction Series No ED 251 292).

Horak, W.J. (1985). A Meta Analysis of Learning Science Concepts From Textual Materials. (ERIC Document Reproduction Series No ED 256 629).

Hungerford, H.R. & Tomera, A.N. (1985). Science Teaching Methods for The Elementary School: A Worktext. Southern Illinois University, Carbondale, IL. Department of Curriculum, Instruction, and Media. (ERIC Document Reproduction Series No ED 260 921).

Hurd, P.D. (1985). Issues Linking Research to Science Teaching. Information Bulletin No. 1. ERIC Clearinghouse For Science, Mathematics, and Environmental Education, Columbus, OH. (ERIC Document Reproduction Series No ED 271 293).

Hurd, P.D. (1986). Update on Science Education Research: The Reform Movement. (ERIC Document Reproduction Series No ED 260 942).

Iona, M. (1981). Observations in The Study of Science. The Physics Teachers, 19(9), 634.

Kirst, M.W. (1984). Choosing Textbooks: Reflections of a State Board President. American Educator, 8(2), 18-23.

Komoski, P.K. (1985). Instructional Materials Will Not Improve Until We Change The System. Educational Leadership, 42(7), 31-37.

Kyle, et.al. (1986). An Implementation Study: An Analysis of Elementary Student and Teacher Attitudes Towards Science A Process Approach Vs. Traditional Science Classes. (ERIC Document Reproduction Series No ED 275 540).

Leonard, W.H. (1987). Does The Presentation Style of Question Inserted Into Text Influence Understanding And Retention of Science Concepts? Journal of Research in Science Teaching, 24(1), 27-37.

Lerner, L.S. & Bennetta, W.J. (1988). The Treatment of Theory in Textbooks: A Scientific Theory is not a Myth, or a Belief, or a Legend. Science Teacher, 55(4), 37-41.

Livingston, J.B. (1989). Reading Into The Subject of Science. The Science Teacher, 56(2), 49-50.

MacGinitie, W.H. (1985). Materials Do Make a Difference. In J. Osborn, P.T. Wilson, & R.C. Anderson (Eds.), Reading Education: Foundations for a Literate America. (pp. 79-84). Lexington, MA: D.C. Heath and Co.

Maeroff, G.I. (1982). Survival of the Fittest And Educational Publishing. Curriculum Review, 21(10), 429-430.

Meyer, L.A., Crummey, L., & Greer, E.A. (1988). Elementary Science Textbooks: Their Contents, Text Characteristics, And Comprehensibility. Journal of Research in Science Teaching, 25(6), 435-463.

Mittlefehldt, B. (1985). Changing Priorities in Elementary Science. Curriculum Review, 24(4), 67-69.

Montgomery, L.E. (1985). A Study of Relationships of Readability Among Elementary Science Textbooks Adopted By Texas Using Five Measures. (Doctoral Dissertation, Texas Women's University, 1985). Dissertation Abstracts International, 46, 1578-A.

Moyer, W.A. (1985). How Texas Rewrote Your Textbooks. The Science Teacher, 52(1), 23-27.

Moyer, W. & Mayer, W. (1985). A Consumers Guide To Biology Textbooks: 1985. Washington, D.C.: People For The American Way.

Muther, C. (1985). Reviewing Research When Choosing Materials. Educational Leadership, 42(5), 86-87.

Muther, C. (1985a). What Every Textbook Evaluator Should Know. Educational Leadership, 42(7), 4-8.

Muther, C. (1984). The Skills Trace. Educational Leadership, 42(3), 82-85.

O'Bryan, P., Junior High Science Teacher, Crestwood Elementary School, Paris, Illinois. (personal communications, February 16, & April 4, 21, 1989)

Orlich, D.C. (1985). Picking and Choosing. Science and Children, 23(1), 10-12.

Osborn, J.H., Jones, B.F., & Stein, M. (1985). The Case For Improving Textbooks. Educational Leadership, 42(7), 9-16.

Owen, D.B. (1962). Handbook of Statistical Tables. Reading, MA: Addison-Wesley Publishing Co., Inc.

Porter, A.C. et.al. (1979). Teacher Autonomy and The Control of Content Taught. East Lansing, MI. (Research Series No 24). Institute for Research on Teaching, Michigan State University. (ERIC Document Reproduction Series No ED 181 006).

Powell, R.R. & Garcia, J. (1985). The Portrayal of Minorities and Women in Selection Elementary Science Texts. (ERIC Document Reproduction Series No ED 255 374).

Risner, G.P. (1989). A Study of Comparison Amongst Five Elementary Level Science Textbooks. (ERIC Document Reproduction Series No ED 249 691).

Risner, G.P. (1987). Cognitive Levels of Questioning Demonstrated By Test Items That Accompany Selected Fifth-Grade Science Textbooks. (ERIC Document Reproduction Series No ED 291 752).

Roth, K. et.al. (1986). Curriculum Materials, Teacher Talk, and Student Learning: (Research Series No. 171) Michigan State University, East Lansing, MI. (ERIC Document Reproduction Series No ED 271 310).

Rubin, A. (1985). How Useful Are Readability Formulas? In J. Osborn, P.T. Wilson, & R.C. Anderson (Eds.), Reading Education: Foundations for a Literate America. (pp. 61-77). Lexington, MA: D.C. Heath and Co.

Scruggs, M.M. (1988). What Research Says...About Textbooks. Science and Children, 25(4), 24-25.

Stake, R.E. (Ed.) (1978). Case Studies in Science Education. Urbana, IL: University of Illinois.

Talmage, H. (1986). Creating Instructional Materials: The Textbook Publisher As Connecting Link. Curriculum Review, 26(1), 8-10.

Talmage, H. (1985). Selecting Instructional Materials: A Four-Part Series. Curriculum Review, 24(5), 188-310.

TenBrink, T.D. (1974). Evaluation: A Practical Guide For Teachers. New York, NY: McGraw-Hill, Inc.

The American Federation of Teacher. (1988). Muddle By Mandate: A Fictionalized Account. American Educator, 12(2), 21-43.

The Association for Supervision and Curriculum Development. (1985). The Pitfalls of Textbook Adoption - And How To Avoid Them, [VHS Videotape] Alenxadria, VA.

The California State Department of Education. (1986). Program Descriptions for Science Instructional Materials, Bureau of Publications, Sacramento, CA. (ERIC Document Reproduction Series No ED 273 433).

The Regional Superintendent of School's Statistics. (1988). Statistics, Summer of 1988, Charleston, IL.

Tyson-Bernstein, H. (1988). The Academy's Contribution to The Impoverishment of America's Textbooks. Phi Delta Kappan, 70,(3), 193-198.

Tyson-Bernstein, H. (1988). America's Textbook Fiasco: A Conspiracy of Good Intentions. American Educator, 12(2), 20-39.

Tyson-Bernstein, H. (1987). Textbook Adoption: The Enemy Is Us. Curriculum Review, 26(4) 9-11.

Tyson-Bernstein, H. (1985). When More Is Less: The "Mentioning" Problem In Textbooks. American Educator, 10(2), 26-44.

Vachon, M.K. & Haney, R.E. (1983). Analysis of Concepts in an Eighth Grade Science Textbook. School Science and Mathematics, 83(3), 236-245.

Wandersee, J.H. (1988). Ways Students Read Texts. Journal of Research In Science Teaching, 25(1), 69-84.

Warming, E.O. & Baber, E.C. (1980). Touchstones For Textbook Selection. Phi Delta Kappan, 61(101), 694-95.

Woodbury, M. (1979). Selecting Instructional Materials. The Phi Delta Kappan Educational Foundation, Bloomington, IN.

Yager, R.E. (1987). Problem Solving: The STS Advantage. Curriculum Review, 26(3), 19-21.

Yager, R.E. (1984). The Major Crisis in Science Education. School Science and Mathematics, 84(3), 189-198.

Yager, R.E. & Penick, J.E. (1983). School Science in Crisis. Curriculum Review, 22(3), 67-70.

Yager, R.E. & Stodghill, R. (1979). School Science in an Age of Science. Educational Leadership, 36(6), 439-445.

Yore, L.D. (1987). A Preliminary Exploration of Grade Five Science Student's Achievement and Ability to Read Science Textbooks as a Function of Gender, Reading Vocabulary, and Reading Comprehension. (ERIC Document Reproduction Series No ED 282 728).

Zuber, A. (1988). Budgeting Procedures. A paper submitted in partial fulfillment for EDA 6650, Eastern Illinois University, Charleston, IL.

Zuber, A., Principal, Crestwood Elementary School, Paris, Illinois. (personal communications, January 29, & February 2, 16, April 4, 21, May 12, and June 6, 1989).

Appendix A

Teacher Survey

Questionnaire on Text Application

1. I like the new science texts.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

2. I do not like the new science texts.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

3. I have no difficulty in incorporating the new science texts into my classroom activities.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

4. I have difficulty in incorporating the new science texts into my classroom activities.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

5. I use the new science texts regularly with my students.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

6. I do not use the new science texts regularly with my students.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

7. I base my classroom learner objectives on the learning objectives in the new science texts.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

8. I do not base my classroom learner objectives on the learning objectives in the new science texts.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

9. I base my classroom learner objectives on our district learner objectives.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

Appendix A

Teacher Survey

Questionnaire on Text Application (Cont.)

10. I do not base my classroom learner objectives on our district learner objectives.

Strongly Agree Agree Undecided Disagree Strongly Disagree

11. I regularly lecture to my classes on material read from or taken out of the textbook.

Strongly Agree Agree Undecided Disagree Strongly Disagree

12. I do not regularly lecture to my classes on material read from or taken out of the textbook.

Strongly Agree Agree Undecided Disagree Strongly Disagree

13. I have students read selections out of the text and then discuss these in class.

Strongly Agree Agree Undecided Disagree Strongly Disagree

14. I do not have students read selections out of the text and then discuss these in class.

Strongly Agree Agree Undecided Disagree Strongly Disagree

15. I regularly use the texts as a reference in the context of lecture/ discussion type instruction.

Strongly Agree Agree Undecided Disagree Strongly Disagree

16. I do not regularly use the texts as a reference in the context of lecture/discussion type instruction.

Strongly Agree Agree Undecided Disagree Strongly Disagree

17. I use the text so that students can work on reports from text information individually or in groups.

Strongly Agree Agree Undecided Disagree Strongly Disagree

Appendix A

Teacher Survey

Questionnaire on Text Application (Cont.)

18. I do not use the text so that students can work on reports from text information individually or in groups.

Strongly Agree Agree Undecided Disagree Strongly Disagree

19. I instruct students to use the text in the context of doing other library type work.

Strongly Agree Agree Undecided Disagree Strongly Disagree

20. I do not instruct my students to use the text in the context of doing other library type work.

Strongly Agree Agree Undecided Disagree Strongly Disagree

21. I have students evaluate materials other than written passages in the text (charts, illustrations, diagrams, experiments).

Strongly Agree Agree Undecided Disagree Strongly Disagree

22. I do not have students evaluate materials other than written passages in the text (charts, illustrations, diagrams, experiments).

Strongly Agree Agree Undecided Disagree Strongly Disagree

23. I have students read passages in the text and make inferences from what they have read.

Strongly Agree Agree Undecided Disagree Strongly Disagree

24. I do not have students read passages in the text and make inferences from what they have read.

Strongly Agree Agree Undecided Disagree Strongly Disagree

25. I have students read passages from the text, and then they answer text or study guide provided questions.

Strongly Agree Agree Undecided Disagree Strongly Disagree

Appendix A

Teacher Survey

Questionnaire on Text Application (Cont.)

26. I do not have students read passages from the text and they do not answer text or study guide provided questions.

Strongly Agree Agree Undecided Disagree Strongly Disagree

27. Students are regularly assigned lab work or experiences which are derived from the text.

Strongly Agree Agree Undecided Disagree Strongly Disagree

28. Students are not regularly assigned lab work or experiments which are derived from the text.

Strongly Agree Agree Undecided Disagree Strongly Disagree

29. Students are regularly "quizzed" or tested based on material from the textbook.

Strongly Agree Agree Undecided Disagree Strongly Disagree

30. Students are not regularly "quizzed" or tested based on material from the textbook.

Strongly Agree Agree Undecided Disagree Strongly Disagree

31. Students are regularly given problems or assignments from the text which require higher order thinking skills such as synthesis or evaluation.

Strongly Agree Agree Undecided Disagree Strongly Disagree

32. Students are not regularly given problems or assignments from the text which require higher order thinking skills such as synthesis or evaluation.

Strongly Agree Agree Undecided Disagree Strongly Disagree

33. I (the teacher), demonstrate various ideas, concepts, and knowledge to the students using the text.

Strongly Agree Agree Undecided Disagree Strongly Disagree

Appendix A

Teacher Survey

Questionnaire on Text Application (Cont.)

34. I (the teacher), do not demonstrate various ideas, concepts, and knowledge to the students using the text.

Strongly Agree Agree Undecided Disagree Strongly Disagree

35. I use lecture/discussion frequently.

Strongly Agree Agree Undecided Disagree Strongly Disagree

36. I do not use lecture/discussion frequently.

Strongly Agree Agree Undecided Disagree Strongly Disagree

37. I use the textbook solely as a resource.

Strongly Agree Agree Undecided Disagree Strongly Disagree

38. I do not use the textbook solely as a resource.

Strongly Agree Agree Undecided Disagree Strongly Disagree

39. I often use the textbook, as a part of my daily classroom activities.

Strongly Agree Agree Undecided Disagree Strongly Disagree

40. I rarely use the textbook as a part of my daily classroom activities.

Strongly Agree Agree Undecided Disagree Strongly Disagree

41. I often assign students readings with or without accompanying questions from the text.

Strongly Agree Agree Undecided Disagree Strongly Disagree

42. I do not often assign students readings with or without accompanying questions from the text.

Strongly Agree Agree Undecided Disagree Strongly Disagree

* Some questions have been modified from (Heller, P., 1984) Minnesota State Survey

Appendix B

Student Textbook Survey

Please provide the following information.

Name_____ Age_____ Grade_____
Teacher_____ Male_____ Female_____

Your 6th Grade Science Teacher_____
(Answer this question only if you were a student at Crestwood during your 6th grade year.)

The type of science class you are currently in:
(Circle One) Physical Earth Life

Now, please answer the following questions about your new science textbooks: (Circle one answer per question)

1. I enjoy my new science textbooks.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

2. I do not enjoy my new science textbooks.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

3. I have difficulty understanding my new science textbooks.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

4. I do not have any difficulty understanding my new science textbooks.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

5. My teachers often use the new science textbooks in my science class.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

6. My teachers seldom use the new science textbooks in my science class.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

7. My new science book is hard to read.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

Appendix B

Student Textbook Survey (Cont.)

8. My new science book is easy to read.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

9. My new science textbook is easier to read and understand than my old science textbook.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

10. My new science textbook is more difficult to read and understand than my old science textbook.

    Strongly Agree Agree Undecided Disagree Strongly Disagree