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The Meyersville School's Utilization of Windows on Science

Art D. Anthony

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THE MEYERSVILLE SCHOOL'S UTILIZATION OF

WINDOWS ON SCIENCE

(TITLE)

BY

ART D. ANTHONY

THESIS

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The Meyersville School's Utilization of Windows on Science®

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ABSTRACT

This study was designed to determine if the students and teachers of Meyersville School, Meyersville, Texas, liked the Windows on Science® program better than learning and teaching science using the traditional book. All students, grades three through six, and teachers, grades one through six, were surveyed regarding their opinion of Windows on Science®.

This field experience indicated the students and teachers liked the Windows on Science® program better than using standard science textbooks. The male students had a higher mean score than the female students or teachers. The teachers felt they needed more experiments to help the students learn Windows on Science® better, but the students didn't think they needed more experiments for this curriculum.

As this was the first year for the students and teachers to utilize the Windows on Science® program, the teachers should be more familiar in the coming year and do a better job teaching. The teachers at Meyersville School using this program should attend one of the "Teaching Tips" workshops sponsored by Windows on Science®. Evaluation of this unique Electronic Instructional Media System (EIMS) curriculum is necessary to prove it is the right path to travel.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

Overview

Introduction and Background

In recent years, more than 350 reports have been published that document the crisis in U.S. science education. These reports offer a galaxy of diagnoses and prescriptions, but consensus remains elusive. One conclusion is unavoidable. The demands of a technical society require that science educators do much better in science education. The development of a plan to do "much better" must begin with a clear statement of purpose and a critical assessment of key variables.

The American Association for the Advancement of Science defines a scientifically literate person as:

> one who is aware that science, mathematics and technology are interdependent human enterprises with strengths and limitations; understands key concepts and principles of science; is familiar with the natural world and recognizes both its diversity and unity; and uses scientific knowledge and scientific ways of thinking for individual and social purposes (Optical Data, 1991, p. 3).

This definition clearly positions scientific literacy as a life skill that should be woven into the fabric of good citizenship. Scientific inquiry, basic research and technological innovation are distinguishing characteristics of the American experiment in democracy and free-market economics. Most children will not become professional scientists or engineers. All will live in a world increasingly dominated by scientific and technical issues. It is in the nation's best interest to prepare our children to lead and thrive in such a future.

Traditionally, education has emphasized textbook learning - in other words, assuming that all students can learn best by reading basal textbooks. This read-first strategy places a significant burden on most students, by presuming that they have the reading readiness skills and experience to decode the words on a textbook page and put those words in context.

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) states:

> 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 (1984) 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" (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) contended 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) stated 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) asserted 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.

Statement of the Problem

Declining scores on standardized science tests indicate that existing teaching strategies are failing to deliver desired results. As concern and criticism have mounted, science textbooks have been the obvious, easy target.

The real villain is a widely used, even institutionalized teaching strategy which assumes that elementary-age children can learn science best by reading basal textbooks. Supplemental support is offered from the passive viewing of filmstrips or movies and the completion of a few hands-on activities.

The read-first strategy places a significant burden on many students. They simply do not have the reading readiness, prior knowledge nor experience to decode the words on the textbook page and place the meaning of those words in context. In response, the video generation labels science "hard" and changes channels.

Passive viewing of audiovisual materials is little better as it lacks interaction. In response, the video-games generation labels science "boring" and drops its quarters somewhere else. Extensive use of hands-on inquiry science actually works quite effectively, but presents formidable logistics problems to most teachers and schools.

The root causes for this situation are an interesting footnote in history. Sometime during this century there was a truly historic moment when the body of "essential" knowledge surpassed the amount of information that could be taught effectively during a grade-school education. In that instant, the Information Age was born, and with it the need for process education strategies. With knowledge now doubling every two and one-half years, the need for change has become imperative. For the most part, our educational system has not adjusted. It is trapped pursuing Industrial Age goals with rusting teaching strategies.

What is needed is a technique for creating functional scientific literacy in all children. The functionally literate person has the tools to decode, or convert into ordinary language, information from sources such as newspapers, magazines, radio and television broadcasts. Literate people also have the tools to encode, or transfer information into personal actions such as problem solving, conversing, letter writing and voting. To decode and encode effectively, to be truly scientifically literate, requires ownership of the basic ideas and symbols of scientific inquiry - its dynamic nature, its concepts and principles in context and its relevance to human endeavors.

Windows on Science® is a complete curriculum for elementary science which has been adopted by the Texas State Board of Education as a "textbook." This innovative program provides students with the opportunity to achieve scientific literacy and has been adopted by 65 percent of Texas elementary schools. As a contemporary basal curriculum, Windows on Science® helps teachers keep up with the latest developments in science. The computer laser disk video program is divided into lesson units for primary grade levels 1 through 3 and intermediate grade levels 4, 5, and 6. The "see-first" approach supports the development of science literacy and reading readiness for elementary students.

As a desired outcome, Windows on Science "seeks to preserve children's natural wonder and curiosity for science while equipping them with the tools to decode and encode science information in their everyday lives" (Buys, 1991, p. 31).

On March 11, 1989, the Texas State Board of Education unanimously approved a resolution to include an "Electronic Instructional Media Systems" (EIMS) category in Proclamation 66 (Texas Legislative Proclamation, 1988) which called for elementary science and microcomputer applications. The intent was to "provide school districts that prefer to implement interactive instructional programs with an alternative to the traditional textbook" (Texas State School Board, 1989, p. 4). The resolution was unprecedented in United States education history, marking the first time emerging instructional technologies were allowed to compete directly with books in the adopting process. Subsequently, the State Board of Education approved the addition of the EIMS category to all future adoptions.

While opening up the process, it did not relieve electronic instructional media systems from the strict regulatory rigor applied to textbooks. An EIMS solution is required to be "a complete program that may be used in lieu of the traditional textbook" (Texas State School Board, 1989, p. 4). Complete is defined as providing mandated content in a "discovery" dynamic, balancing the instruction with activities and developing and exercising process skills for application in everyday life. The Windows on Science® Program is an alternative to the traditional textbook, meeting both the state's Proclamation 66 (Texas Legislative Proclamation, 1988) criteria and the emerging Project 2061 (National Science Reform, 1990) national reform agenda.

For many years, basal science programs have provided equal treatment of life, earth and physical science at each grade level, the so-called balanced, spirally developed scope and sequence. By calling for a focus on life science in the first grade, earth science in the second grade and physical science in the third grade, the Agency aligned the introduction of increasingly abstract concepts with the natural development of ability and a world view in young children. The Proclamation calls for the "focus cycle" to repeat itself in the intermediate grades, again matching increasingly complex science content with increasingly sophisticated and prepared learners.

The focus-cycle approach also offers future benefits. By breaking down the strict separation and balanced presentation of life, earth and physical science, it configures the elementary science instruction implemented to better support the structural changes underway in secondary science instruction in the nation.

In Texas, all textbooks are approved or disapproved for adoption by the State Board of Education. In 1989 the Board declared elementary science had two regular science textbooks and one EIMS from which the elementary teachers could choose. In the Spring of 1990, Meyersville Schools' six elementary teachers voted 5-0 to adopt Windows on Science®. One teacher could not make up her mind and abstained from voting.

The Meyersville elementary teachers were having trouble successfully teaching science. They either lacked confidence in their science background knowledge or time to teach the curriculum in the classroom so students' understanding was not sufficient. Elementary students do not seem to be able to learn the required science well enough by reading the science texts and doing experiments to supplement the science textbook.

Demographics

Meyersville is a typical example of rural Texas. The town consists of a post office, general store, and several churches. Services not available in Meyersville are readily obtainable in Cuero or in Victoria, some thirty miles away.

The school district consists of the small towns of Meyersville and Arneckeville, located seven and thirteen miles south of Cuero respectively. Meyersville Independent School District is located on gently rolling hills of South Texas. Located in the coastal plains region about 60 miles from the gulf coast, Meyersville has the typical South Texas climate of cool-mild winters and hot summers.

The school offers instruction in grades kindergarten through eighth. All school facilities are located on one campus. Students in grades nine through twelve as well as special education students are transferred to Cuero Independent School District.

The present Meyersville School is a consolidation which occurred in 1962, between Meyersville, Green, DeWitt, and Arneckeville. Public school education in this area began in 1884 at Golly School, a one room school, which housed grades one through seven and consisted of thirty-five students. The Green-DeWitt School house began in 1900 and was consolidated with Arneckeville School in 1949. Arneckeville joined the Meyersville School in 1963. Prior to this time, the educating of students was supervised by one of the local Lutheran churches.

Meyersville School District's 1991-1992 statistics included:

- Enrollment - 165
- Employees - 20
- Operating Budget - $785,000
- Appraised Valuation - $53,000,000
- Maintenance and Operation - $1.25 (nothing is owed on the building and equipment)
- Appraised valuation per student - $321,000 (Whitson, 1992).

The public school grew rapidly during the 1940s and 1950s. A new school was built and completed in 1959. The new school consisted of first through eighth grades; an addition was later added to include the kindergarten class.

The Meyersville School District currently composes an area approximately 88 square miles in

DeWitt County and 10 square miles in Victoria County. Fifty percent of the tax base is derived from oil and gas revenue and 30 percent from ranching ventures. The remaining 20 percent is from other sources. The Meyersville School District is in good financial shape as it has enough money invested to support the school one full year without local, state or federal funding.

History

The Meyersville area is rich in history. The first white man in the area was killed by the fearsome Commache Indians as he was getting a drink of water from a local spring in the year 1832. This area was basically dominated by the cannibalistic Indian tribe called the Karankawa.

The founders of Meyersville were Adolf Meyer and his sister, Maryanne. After arriving from Germany in the year 1846, the new immigrants walked from Galveston to Meyersville which is about 160 miles. They settled in the area because of the low-lying prairie as well as the rich-fertile soil which was good for farming and ranching. The natural springs provided good drinking water and later the Chisholm Trail was used to drive cattle to market through the area.

Life was hard for those early white settlers who originally settled in the area. They endured many hardships just to survive. Today the community is dominated by German ethnic settlers who still believe in hard work, rearing the children under strict parent supervision, and providing them with a good education.

Different churches were established in the new community. Two Lutheran and one Catholic Church dominate the area and were in charge of educating the young people until the first public schools began in 1881.

Assumptions

It is assumed that the responses gathered from faculty and students are based on their true feeling about the Windows on Science® program. All teachers using Windows on Science® were surveyed. All the students in grades 3 through 6 learning from the Windows on Science® for the first year were also surveyed.

Delimitations

This field experience focused on the concept of teaching science in elementary school via an "Electronic Instructional Media System" (EIMS) which was called Windows on Science®. A comparison of Windows on Science® to the traditional science textbooks was made. The responses to the survey included all six teachers utilizing the Windows on Science® and students in grades 3 through 6 taking the Windows on Science® for the first time.

Operational Definitions

Meyersville School. A K-8 school with an enrollment of less than 200. The majority of the student body is white (95 percent); the remainder (5 percent) is Hispanic. Approximately 10 percent of the students come from low income backgrounds.

Student Survey. An instrument utilized to survey the students' perceptions of the Windows on Science® program. The survey utilizes a Likert scale to assess the student perceptions of the Windows on Science® program. (see Appendix A)

Science Textbooks. A textbook which has traditionally been used to teach students science in grades 1-6.

Teacher Survey. An instrument utilized to survey teachers' perceptions of the Windows on Science® program. The survey uses a Likert scale to assess faculty perceptions of the Windows on Science® program. (See Appendix B)

Windows on Science®. An "electronic

instructional media system (EIMS) used to teach elementary science. It requires a laser disc video player hooked to a TV or computer screen. Changing of the individual pictures or movie clip is controlled by a removed control unit which is handled by the teacher.

Uniqueness of Windows on Science®

Many elementary teachers dread having to teach science and, in numerous instances, are ill-prepared to do so. Science is usually scheduled as the last subject matter for the school day. Therefore, if the elementary teacher is running behind with other subjects during the day, science is not taught. This of course means the elementary students fall behind even more in the field of science. Before Meyersville elementary teachers adopted the Windows on Science® program, most of them stated, "Anything would be better than what they were doing before!"

A program which seeks to accomplish broad educational goals across the entire student population must acknowledge and capitalize on the characteristics common to all learners. Not surprisingly, nature offers the answer. The patterns inherent in early childhood learning are the common denominator.

By nature, the human organism is attentive to novel stimuli. Any child is a curious and able learner, a veritable question machine when allowed to interact with rich and complex information. The young mind is equipped with miraculous data collection mechanisms, the human senses. Input from the senses allows reason to be applied to the world, its mixture of patterns and chaos. Through reason, the child begins to build an individual world view, that marvelous combination of objective and subjective conclusions.

A very young child can see and differentiate before being able to label what is seen. The child can also associate spoken words with concepts and objects before communicating, either in verbal or written form. Through touch, the child knows many physical characteristics of things long before searching for intellectual explanations. What eventually emerges from this natural, experiential analysis is the context necessary to understand and apply the ideas and symbols for critical thinking, speech, reading, and writing.

This describes human channels of learning. The channels have been identified as visual, auditory, and kinestetic/tactile. Although many humans have a preferred channel, the most effective learning experience incorporates all three in a complementary manner. This is called multisensory learning and it is one of the keys to effective science instruction (Krashen, 1986).

The other key is acceptance that scientific literacy is achieved through a cumulative, skill-building process involving several steps. For productive learning to take place, each step should be addressed with an appropriate teaching strategy. This concept of building knowledge embraces the constructivist philosphy of learning, now being endorsed by many professional educators (Mager, 1962).

Meyersville School scholastically ranks in the top 100 out of 4,000 elementary and junior high schools in the state. The science scores have continued to slowly increase the last four years. More improvement is needed in the science scores if Meyersville School is to continue to maintain its scholastic leadership in the state. There has never been a study in any of the four county area where the effectiveness of any program has been formally measured.

CHAPTER II

Rationale, Related Literature and Research on Windows on Science®

Rationale

In 1983, Windows on Science® had been in development for more than two years. Its learning model was born in a pragmatic assessment of the root causes underlying the crisis in science education. Its instructional design had been forged in 68 field-test classrooms, 15 of them in Texas. The basic product design, teaching strategies and classroom utility of Windows on Science® has been confirmed by evaluating the use of a first-generation, intermediate earth science package in more than 500 schools nationwide.

Windows on Science® rests on the single, fundamental premise that first contact with science concepts, ideas and vocabulary must be experiential, immediate, concrete and memorable. Reading first to learn science is a difficult task for elementary-age children. Reading in the science content area is a critically important process skill which must be developed and exercised systematically for application throughout life.

Building on this premise, Optical Data

Corporation (1991) crafted an adoptable, usable program, that can teach science, scientific thinking and values to teachers and students. The program employs teaching strategies equally sensitive to the professional needs of teachers and the vast range of student learning styles. Windows on Science® endorses and applies the major theme of "Science for All Americans" and includes the learning needs of all children, stresses everyday relevance and lifelong connections, promotes the spirit and character of scientific inquiry and values, and teaches scientific ways of thinking.

This laser videodisc provides the means to achieve the goals for Windows on Science® to be cost-effective. It also casts the presentaton of content and much of the learning experience in the most compelling and widely consumed medium today, television.

Imagine taking students on a life science field trip to Sweetwater for the annual rattlesnake roundup or to San Antonio to see a killer whale give birth. How about a physical science field trip to Six Flags where students ride a roller coaster, observing a variety of simple and complex machines and the interplay between potential and kinetic energy? An earth science field trip journeys out to the Glass Mountains in Texas' Big Bend country where students study layers of the earth's surface to learn about the rock cycle. These are just four of the thousands of unique vistas captured and waiting for young explorers on the Windows on Science® videodiscs.

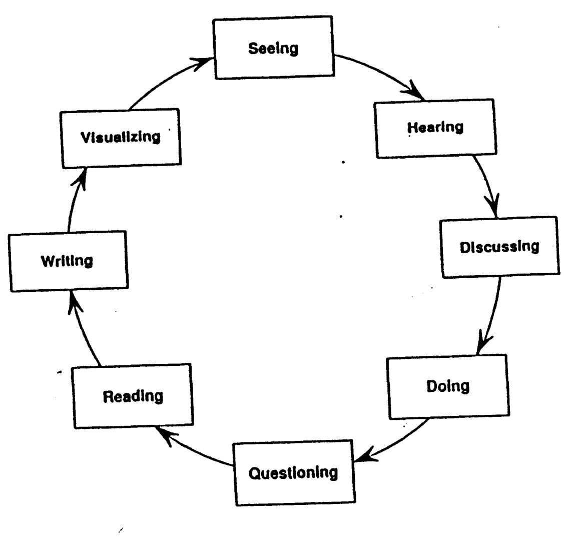
The study of the Meyersville School's success or failure with Windows on Science® could be monumental. Everyone is clamoring for change in education, urging teachers to be more progressive in teaching. Windows on Science® could provide that kind of unique method that could catapult education into the forefront of real learning not seen since public schools began. If this is successful in science, why wouldn't it work with other subject matter?

Review of Literature and Research - Electronic Instructional Media Systems (EIMS)

Scientific knowledge, combined with decision-making and systematic thinking skills, empowers students to affect the course of their lives in society. Windows on Science® is designed to promote the attitudes, knowledge and investigative skills students need to be scientifically literate. This is accomplished by building on student enthusiasm for science, teaching basic skills and assisting students in acquiring scientific knowledge (Barufaldi, 1988). Students must feel confident they can succeed in science, enjoy the challenges of finding out and develop solid conceptual background.

The Windows on Science® learning model is rich in its use of multisensory strategies and the respect it affords the natural behavior of the human learner. This is referred to as the Circle of Learning (Fig .1).

Figure 1: Circle of Learning



(Optical Data Corporation. (1991). Program rationale. Warren, NJ: Author, p. 31.

In the Windows on Science® classroom, first contact with science concepts and principles is experiential, immediate, concrete and memorable. The teacher leads science expeditions using visuals from a laser videodisc. During these expeditions, Seeing, Hearing and Discussing develop associations, labels and context in a rich, stimulating, multisensory atmosphere. This lesson strategy allows all students to participate in the acquisition of science content. Below-level reading skills or limited English proficiency do not exclude some students immediately.

Windows on Science® is organized by units of study. Lessons within each unit are designed, using a specific learning model, to develop, expand and consolidate a scientific concept. The Circle of Learning model presents information and develops concepts naturally by using the three channels used by learners - visual, auditory and kinesthetic/tactile.

A Windows on Science® lesson begins with seeing images that illustrate key ideas and relationships. Students decode the visual images, taking the first steps in concept development, as well as learning to be critical consumers of visual information. As students see the images, they hear the teacher describe and label the concepts given. Teachers are able to modify their emphasis in response to students' comprehension. While involved in seeing and hearing, the students and teacher discuss the ideas presented. Thus, the lessons have a conversational tone, building on natural associations and inviting participation.

To develop scientific habits of mind, students need to do experiments. Working together in groups they develop cooperative learning strategies. They also learn the more sophisticated integrated process skills of formulating hypotheses, controlling variables, experimenting, formulating models and interpreting data (Rakow, 1986). Doing experiments, the students test and examine the concepts learned in the video lesson. They are given the opportunity to verify, extend and explore the uses of the scientific concepts learned. When students question the relationships, their thinking evolves from comprehension and application to analysis.

This leads naturally into reading about the concepts in a nonfictional passage. Reading verifies and extends the connections made by students as they actively seek information from the text. Writing allows students to communicate about what they have learned. This process also allows them to take ownership of their knowledge. In visualizing, students have an opportunity to reflect on, internalize and integrate what they have learned.

Up to this point in the lesson, students have been decoding information and ideas. Writing allows them to encode the concepts developed and communicate what they have learned. The science concepts become a part of their own stock of knowledge, owned and transformed by them, to help make sense of the world and serve as the basis for new ideas (Bransford & McCarroll, 1974).

Visualizing is intended to provoke students' thinking, to extend "what is" to "what might be." Students may be asked to make new connections, take apart old ideas or look for new applications. Teachers and students can create more higher-level thinking questions (Davis, 1985). Visualizing will lead to more learning as the students are motivated to extend their knowledge base, and the circle will begin anew.

The Circle of Learning as a learning model is supported by what we know about how children learn. The lessons contain clearly stated objectives helping both the teacher and students focus on the purpose of that curriculum (Mager, 1962; Good & Brophy, 1984). Students' attention is provoked and then maintained with the combination of visually interesting and mentally stimulating information. Windows on Science® facilitates and encourages student learning and achievement, allowing them to be successful (Bandura, 1977). The concept development strategy of Windows on Science® mirrors students' innate learning styles and builds on them, ensuring interest and success in science from students with a wide range of abilities.

Windows on Science® gives the opportunity to change our students from passive visual consumers into critical visual literates. Those having both print and visual literacy will gain most from any learning experience.

Windows on Science® is the first media that recognizes and complements the most effective interactive "device" in the classroom, the teacher. The dialogue of interaction between teacher and students now becomes a Trilog with the addition of the laser videodisc.

The Circle of Learning is brought to life in the Windows instructional model. During a Windows on Science® lesson, the teacher joins the students in the pursuit of knowledge, albeit as the expedition leader equipped with guidebooks (the Windows on Science® teacher materials). Multisensory experiences - Seeing, Hearing and Discussing - are present and used as "discussion drivers."

This lesson dynamic creates three-way interaction between the teacher, students and the laser videodisc visuals. This is the Trilog. Consider the Trilog a readiness factor for scientific literacy. The Trilog effectively replaces the passive viewer of traditional audiovisual materials with an active explorer.

Laser videodisc technology makes this innovative teaching strategy possible. The laser videodisc's tremendous storage capacity allows massive libraries of visual (learning experiences) to be resident in the classroom. Each side of the laser videodisk would be equivalent to 54,800 pages of text. The laser videodisc's random access capability allows any of those learning experiences to be retrieved in seconds. The teacher completely controls the sequence and pace of presentation.

The benefits provided by the Trilog and Windows on Science® materials are significant. Instruction time is maximized. In the Windows Trilog, every visual has purpose and is observed and critically examined by the teacher and students as part of the basic learning process.

The teacher controls the ultimate engagement tactic, interactive video, and the pace of concept development based on constant feedback from students. The teacher may respond to students' blank stares with an instantaneous return to the point where they were lost. This allows the teacher to immediately reteach the information the students do not understand. Real-time reteaching.

The Trilog offers a variety of teaching strategies for differences in learning style. Most importantly, all students, regardless of skill level, can participate and learn.

The teacher's role in Windows on Science® instruction extends significantly beyond laser videodisc operator. The teacher owns a large stake in the content integrity.

Windows on Science® is a massive body of knowledge. Unlike the pupil editions of textbooks, the teacher decides to what content students are exposed. Utilizing Windows on Science®, the weaknesses and criticisms of bound books can be avoided, including the presence of superfluous material, topic glut, dumbed-down language and even obsolete information, students will continue to see the Berlin Wall in their social studies books for the next several years.

The question arises - "Will teachers employ these strategies?" Clearly Windows on Science® requires more than a teacher learning to operate a laser videodisc player. It asks the teacher to reflect on the teaching practices and shed some Industrial Age baggage. The teacher is ultimately the agent of change in the classroom.

Windows on Science® places great technology in the service of artful teaching. Only the teacher can bring the Windows materials to life, making the science instruction more productive and equitable. Windows on Science® was designed to also teach the teacher.

Successful learning from Windows on Science® comes from several critical elements. The interactivity of the lessons, and the emphasis on sharing and cooperative learning provide for the enhancement of students' self-concepts and feelings of success. Concrete models in the visuals and in the reading passages allow the students to learn more than vocabulary - they learn meaning. Windows on Science®

provides students with problems to solve, giving them the basis of scientific method. The questioning that is an integral part of a Windows on Science® lesson allows the teacher to focus student attention, motivate their interest, monitor understanding and provide for reflection.

Windows on Science® teaches students scientific method through two techniques - replication of classic experiments possible within the constraints of the classroom, and inquiry based on visuals which engage students in observing, collecting and analyzing information about situations unable to be recreated in the classroom. This combination of replication and inquiry parallels the real world use of scientific method by practicing scientists.

Teaching students how to process information from pictures, words, diagrams, charts and graphics is essential to their future success as learners and as producers of new ideas. Students develop concepts and vocabulary through the laser videodisc lesson and hands-on activities, giving them several of the prerequisites for effective reading.

Within the ancillary readers, the Concept Map lays out the concepts and their relationships to each other. The Glossary provides the key concept words from the lesson and can be used to decode the Concept Map and Reading Passage. The SQ3R (Survey, Question, Read, Review, Recite; Johnson, 1964; Robinson, 1962) technique is an approach which emphasizes investigation and mirrors the "see-first" strategy of the laser videodisc lesson as well.

Writing draws on relevant student knowledge and experience in prepration for learning about a new topic. It assists the student in consolidating new information and guides the student in reformulating or extending information (Langer & Applebee, 1987). Writing assignments may evoke hypothesizing, questioning and summarizing. The process of writing also engages the student with the material for an extended period of time, involving the student in reflection on the nature and meaning of what has been learned. This increases the probability of retention and the potential use of that information.

During the academic year 1980-1981, nearly one-quarter of our 2.3 million public school teachers found that one or more of their students were not fully proficient in English. Since Limited English Proficient (LEP) students not only must learn English, but content as well, the most effective program combines language with content (Optical Data, 1991).

According to Krashen (1983), students become fluent and accurate as a result of extensive exposure to comprehensible, language-rich experience. During these experiences, students move through the stages of conversation, comprehension and extended writing.

Windows on Science® provides a visually rich and language-intensive environment for LEP students. Concept development occurs gradually, supported by a variety of visuals. The suggested methods of instruction are highly interactive, offering the natural-language experience so helpful to students learning English as a second language. The discussion among students about their common visual experiences provides a social context for developing the cognitive structures to support language development.

The Circle of Learning model is designed to encourage a dynamic learning process in which both students and teachers use assessment information to adjust subsequent learning experiences. The Windows on Science® instructional model supports the critical ingredient, the teacher as an experienced partner, in giving immediate and expert feedback that speeds and deepens the learning process.

Review of Literature and Research - Science Textbooks

Ferris et al. (1984) concurred with Risner (1987) in their reviews of various texts that poor text organization and structuring often neglects students' 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 level/ability, tended to turn students off to science. Scruggs also concurred with Hurd that more importance needed to be given to the selection, adoption and implementation processes of middle-level science texts.

Livingston (1989) found that students benefited when 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 difficulty.

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 political or philosophical compromises made to keep a wide-appeal for the sake of profits, to appease certain interest groups, or simple carelessness.

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 committee of students to survey upcoming chapters of the text for difficult sections or unfamiliar words/concepts.

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 verbal technological dinosaur.

MacGinitie (1985) emphasized the idea that most classes have too wide a variation in the levels of student abilities for the typical narrow focus of texts and related materials. MacGinitie contended 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 as well as the worst readers in most classrooms end up using inappropriate materials. MacGinitie also contended that more varied and ability specific materials, coupled with more teacher help for students, would go a long way to remedy this situation.

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

CHAPTER III

Design of the Study

Research Questions

An important part of any school's evaluation of traditional textbook teaching and learning is the feedback provided by those using the material. The questions on which this study focused were:

Question 1. What are the opinions of students reqarding the Windows on Science® program?

Question 2. Do the opinions of male and female students differ regarding the Windows on Science® program?

Question 3. What are the opinions of the teachers that have used the Windows on Science®?

Question 4. Do differences exist between students' and teachers' opinions of the Windows on Science® program?

Sample and Population

All six teachers in grades one through six in Meyersville School that used Windows on Science® this past school year were surveyed. The students in grades three through six were surveyed regarding their opinions about the Windows on Science® program. There were 27 males and 41 females making a total of 68 students surveyed. The author questioned the reliability of surveying the students in grades one and two.

Data Collection and Instrumentation

The survey instruments utilized comparing traditional science textbook teaching to the Windows on Science® program were developed by Optical Data Corporation, 1984 Minnesota State Survey (Heller, 1984), and modified by the author. The questions were selected because they reflected factors germane to Science textbooks and the Windows on Science® program. The survey consists of two separate instruments: (a) student opinions regarding Windows on Science® and (b) teacher opinions about the Windows on Science® program.

The Students Opinion Survey regarding the Windows on Science® program was conducted by the author in February of 1992 as a group. Two students were absent during the survey. At the time of the students' survey, they had been taught about six months using the Windows on Science®. The Teacher Opinions Survey regarding the Windows on Science® program was conducted in late May after the teachers had a full school year to use the program. All six teachers were given the survey to complete on personal time. The teachers all returned the survey within a week.

Data Analysis

The results of the two surveys were evaluated. The analysis of the Teacher and Student Opinion Inventory yielded an item analysis providing two statistics: (a) percentage of respondents making each choice and (b) an item mean.

Seven questions were identical on the two surveys. With these seven items, comparisons were made to see how the two different groups viewed the Meyersville School Windows on Science® program. The items common to the two surveys were:

1. I enjoy Windows on Science®.
2. Students understand the new Windows on Science® better than from the science textbook.
3. Teachers often use the Windows on Science®.
4. The new Windows on Science® is more easily understood than the science books.
5. Students are forced to be better note takers when learning with the Windows on Science®.
6. Notes are helpful in learning the material

in the Windows on Science®.

7. There are enough experiments in the Windows on Science® to help one learn.

CHAPTER IV

Results and Conclusions

Student Opinion Survey

There were seven item questions used in the Student Opinion Survey to answer the four research questions. The research questions were:

Question 1. What are the opinions of students regarding the Windows on Science® program?

Question 2. Do the opinions of male and female students differ regarding the Windows on Science® program?

Question 3. What are the opinions of the teachers that have used the Windows on Science®?

Question 4. Do differences exist between students' and teachers' opinions of the Windows on Science® program?

Results for Research Question Number 1:

"What are the opinions of students regarding the Windows on Science® program?"

Table 1 presents the mean scores and percentages of the Student Opinion Survey on Windows on Science®. The scale average scores were interpreted using the following scale: 5 = Very Favorable; 4 = Unfavorable; 3 = Neutral; 2 = Unfavorable; and 1 = Very Unfavorable.

Scores between three and four are interpreted as being somewhat favorable. Scores between two and three are interpreted as somewhat unfavorable. The caption all students represents the data used to answer Question 1.

Table 1 clearly shows all the students liked the Windows on Science® with an average score of 3.93. The seven item mean scores for all students showed the following questions had the highest acceptance among the students: Question 3: My teacher often uses the Windows on Science®, with a mean of 4.29; Question 6: Notes are helpful in learning the material in the Windows on Science®, with a mean of 4.09; and Question 1: I enjoy Windows on Science®, with a mean of 4.05.

Results for Research Question Number 2

> "Do the opinions of male and female students differ regarding the Windows on Science® Program?"

Table 1 presents the mean scores and percentages of the Student Opinion Survey on Windows on Science®. The scale average scores were interpreted using the following scale: 5 = Very Favorable; 4 = Unfavorable; 3 = Neutral; 2 = Unfavorable; and 1 = Very Unfavorable. Scores between three and four are interpreted as being somewhat favorable. Scores between two and three are interpreted as somewhat unfavorable. The caption male and female represents the data used to answer Question 2.

Table 1 clearly shows the males mean score on the first six questions was higher than the females. Question 7: There are enough experiments in the Windows on Science® to help me learn, the male and female scores were virtually the same at 3.64. The males scored the Windows on Science® program higher than the females or teachers.

There average mean score for the females for all seven questions on the Windows on Science® is 3.79. The average mean score for the males for all seven questions on the Windows on Science® is 4.07. The average mean score for all the students for all seven questions on the Windows on Science® is 3.93.

Table 1

Responses of students by gender regarding opinions toward the Windows on Science® program.

Scale

	Key	Points
SA	Strongly Agree	5
A	Agree	4
U	Undecided	3
D	Disagree	2
SD	Strongly Disagree	1

1. I enjoy Windows on Science®.

	SA	A	U	D	SD	Mean
Males	9(33%)	14(52%)	3(11%)	0(0%)	1(4%)	4.11
Females	11(29%)	22(54%)	4(10%)	2(4%)	2(4%)	3.98
All Students	20(29%)	36(53%)	7(10%)	2(3%)	3(4%)	4.05

2. I believe students understand the new Windows on Science® better than from the science textbook.

	SA	A	U	D	SD	Mean
Males	11(41%)	8(30%)	4(15%)	2(7%)	2(7%)	3.89
Females	9(22%)	16(39%)	10(24%)	3(7%)	3(7%)	3.61
All Students	20(29%)	24(35%)	14(21%)	5(7%)	5(7%)	3.75

3. My teacher often uses the new Windows on Science®.

	SA	A	U	D	SD	Mean
Males	15(56%)	7(26%)	4(15%)	1(4%)	0(0%)	4.33
Females	20(49%)	14(34%)	4(12%)	1(2%)	1(2%)	4.24
All Students	35(51%)	21(31%)	9(13%)	2(3%)	1(1%)	4.29

4. The new Windows on Science® is more easily understood than the science books.

	SA	A	U	D	SD	Mean
Males	12(44%)	7(26%)	4(15%)	3(11%)	1(4%)	3.96
Females	10(24%)	17(41%)	4(10%)	7(17%)	3(7%)	3.59
All Students	22(33%)	24(35%)	8(12%)	10(15%)	4(6%)	3.78

5. Students are forced to be better note takers when learning with the Windows on Science®.

	SA	A	U	D	SD	Mean
Males	15(56%)	6(22%)	4(15%)	2(7%)	0(0%)	4.26
Females	16(39%)	12(29%)	2(5%)	3(7%)	9(22%)	3.63
All Students	31(46%)	18(26%)	6(9%)	5(7%)	9(13%)	3.95

6. I feel these notes are helpful in learning the material in the Windows on Science®.

	SA	A	U	D	SD	Mean
Males	15(56%)	7(26%)	4(15%)	1(4%)	0(0%)	4.33
Females	10(24%)	24(58%)	1(2%)	3(7%)	3(7%)	3.85
All Students	25(37%)	31(46%)	5(7%)	4(6%)	3(4%)	4.09

7. There are enough experiments in the Windows on Science® to help me learn.

	SA	A	U	D	SD	Mean
Males	3(11%)	14(52%)	7(26%)	3(11%)	0(0%)	3.63
Females	9(22%)	15(37%)	13(32%)	2(5%)	2(5%)	3.65
All Students	12(16%)	29(43%)	20(29%)	5(7%)	2(3%)	3.64

Results for Research Question Number 3

"What are the opinions of teachers that have used the Windows on Science®?"

Table 2 presents the mean score and percentages of the Teacher Opinion Survey on Windows on Science® and presents the data to answer Question 3. The scale average scores were interpreted using the following scale: 5 = Very Favorable; 4 = Unfavorable; 3 = Neutral; 2 = Unfavorable; and 1 = Very Unfavorable. Scores between three and four are interpreted as being somewhat favorable. Scores between two and three are interpreted as somewhat unfavorable.

Table 2 shows the first six questions had a mean score of 3.83 or above (somewhat favorable) and thought the Windows on Science® was doing a good job except for Question 7: There are enough experiments in the Windows on Science® to help students to learn. The mean score of that question was 2.17 which means the teachers felt there were not enough experiments in the Windows on Science® curriculum to help students learn.

The average mean score for the teachers for all seven questions on the Windows on Science® is 3.74. This mean score was lower than the male mean score (4.07), the female mean score (3.79), and the combined student mean score (3.93). If you remove the mean score of Question 7 (2.17), the teachers' mean score would be 4.00.

Table 2

Responses of teachers regarding opinions toward the Windows on Science® program.

Scale		
Key		Points
SA	Strongly Agree	5
A	Agree	4
U	Undecided	3
D	Disagree	2
SD	Strongly Disagree	1

1. I enjoy Windows on Science®.

	SA	A	U	D	SD	Mean
Teachers	3(50%)	2(33%)	1(16%)	0(0%)	0(0%)	4.33

2. I believe students understand the new Windows on Science® better than from the science textbook.

	SA	A	U	D	SD	Mean
Teachers	1(16%)	3(50%)	2(33%)	0(0%)	0(0%)	3.83

3. I often use the new Windows on Science®.

	SA	A	U	D	SD	Mean
Teachers	3(50%)	2(33%)	0(0%)	1(16%)	0(0%)	4.16

4. The new Windows on Science® is more easily understood than the science books.

	SA	A	U	D	SD	Mean
Teachers	1(16%)	4(67%)	1(16%)	0(0%)	0(0%)	4.00

5. Students are forced to be better note takes when learning with the Windows on Science®.

	SA	A	U	D	SD	Mean
Teachers	3(50%)	1(16%)	1(16%)	0(0%)	1(16%)	3.83

6. I feel these notes are helpful in learning the material in the Windows on Science®.

	SA	A	U	D	SD	Mean
Teachers	2(33%)	1(16%)	3(50%)	0(0%)	0(0%)	3.83

7. There are enough experiments in the Windows on Science® to help students to learn.

	SA	A	U	D	SD	Mean
Teachers	0(0%)	2(33%)	0(0%)	1(16%)	3(50%)	2.17

Results for Research Question Number 4

"Do differences exist between students' and teachers' opinions of the Windows of Science® program?"

Table 3 presents the mean scores and percentages of the Student and Teacher Opinion Surveys on the Windows on Science®. The scale average scores were interpreted using the following scale: 5 = Very Favorable; 4 = Favorable; 3 = Neutral; 2 = Unfavorable; and 1 = Very Unfavorable. Scores between three and four are interpreted as being somewhat favorable. Scores between two and three are interpreted as somewhat unfavorable.

The teachers mean scores were higher than the students on the following questions:

1. I enjoy the Windows on Science®.
2. Students understand the new Windows on Science® better than from science textbooks.
4. The new Windows on Science® is more easily understood than the science books.

The students mean scores were higher than the teachers on the following questions:

3. Teachers often use the new Windows on Science®.

5. Students are forced to be better note takers when using Windows on Science®.

6. Notes are helpful in learning the material in the Windows on Science®.

7. There are enough experiments in the Windows on Science® to help one learn.

The average mean score for the students on all seven questions regarding Windows on Science® is 3.93. The average mean score for the teachers on all seven questions regarding Windows on Science® is 3.74.

Table 3

Responses of students and teachers regarding opinions toward the Windows on Science® program.

Scale		
Key		Points
SA	Strong Agree	5
A	Agree	4
U	Undecided	3
D	Disagree	2
SD	Strongly Disagree	1

1. I enjoy Windows on Science®.

	SA	A	U	D	SD	Mean
All Students	20(29%)	36(53%)	7(10%)	2(3%)	3(4%)	4.05
Teachers	3(50%)	2(33%)	1(16%)	0(0%)	0(0%)	4.33

2. Students understand the new Windows on Science® better than from the science textbook.

	SA	A	U	D	SD	Mean
All Students	0(29%)	14(35%)	14(21%)	5(7%)	5(7%)	3.75
Teachers	1(16%)	3(50%)	2(33%)	0(0%)	0(0%)	3.83

3. Teacher often uses the Windows on Science®.

	SA	A	U	D	SD	Mean
All Student	35(51%)	21(31%)	9(13%)	2(3%)	1(1%)	4.29
Teachers	3(50%)	2(33%)	0(0%)	1(16%)	0(0%)	4.16

4. The new Windows on Science® is more easily understood than the science books.

	SA	A	U	D	SD	Mean
All Students	22(33%)	24(35%)	8(12%)	10(15%)	4(6%)	3.78
Teachers	1(16%)	4(67%)	1(16%)	0(0%)	0(0%)	4.00

5. Students are forced to be better note takers when learning with the Windows on Science®.

	SA	A	U	D	SD	Mean
All Students	31(46%)	18(26%)	6(9%)	5(7%)	9(13%)	3.95
Teachers	3(50%)	1(16%)	1(16%)	0(0%)	1(16%)	3.83

6. Notes are helpful in learning the material in the Windows on Science®.

	SA	A	U	D	SD	Mean
All Students	25(37%)	31(46%)	5(7%)	4(6%)	3(4%)	4.09
Teachers	2(33%)	1(16%)	3(50%)	0(0%)	0(0%)	3.83

7. There are enough experiments in the Windows on Science® to help one learn.

	SA	A	U	D	SD	Mean
All Students	12(16%)	29(43%)	20(29%)	5(7%)	2(3%)	3.64
Teachers	0(0%)	2(33%)	0(0%)	1(16%)	3(50%)	2.17

Identical Item Inventory

The research question addressed through the two surveys was, "What are the comparative results of teachers, males, females, and all students for the identical question asked each group?"

Table 4 presents the seven questions, the scale average score for the teachers, males, females, and all students. The mean scale score for each question is also presented. The scale average scores were interpreted using the same scale as the Teacher Opinion Survey. In addition, Table 5 presents the percentile of teachers, males, females, and all students responding to each of the identical questions.

Table 4

Results of Identical Items

	Teacher	Male	Female	All Students	Mean Score
1. I enjoy Windows on Science®.	4.33	4.11	3.98	4.05	4.14
2. I believe students understand the new Windows on Science® better than from the science textbook.	3.83	3.89	3.61	3.75	3.78
3. I often use the new Windows on Science®.	4.16	4.33	4.24	4.29	4.24
4. The new Windows on Science® is more easily understood than the science books.	4.00	3.96	3.59	3.78	3.85
5. Students are forced to be better note takers when learning with the Windows on Science®.	3.83	4.26	3.63	3.95	3.91
6. I feel these notes are helpful when learning the material in the Windows on Science®.	3.83	4.33	3.85	4.09	4.00
7. There are enough experiments in the Windows on Science® to help the student learn.	2.17	3.63	3.65	3.64	3.15

* The mean scale score for All Students was not used to find the Mean Scale Score.

Table 5

Percentile of Teachers, Male, Female, and All Students

	Very Fav				Favorable				Neutral				Unfavorable				Very Unfav			
Item	T	M	F	S	T	M	F	S	T	M	F	S	T	M	F	S	T	M	F	S
1.	50	33	29	29	33	14	22	36	16	11	10	10	0	0	2	2	0	4	4	4
2.	16	41	22	20	50	30	39	35	33	15	24	21	0	7	7	7	0	7	7	7
3.	50	56	49	51	33	26	34	31	0	15	12	13	16	4	2	3	0	0	2	1
4.	16	44	24	33	67	26	41	35	16	15	10	12	0	11	17	15	0	4	7	6
5.	50	56	39	46	16	22	29	26	16	15	5	9	0	7	7	7	16	0	22	13
6.	33	56	24	37	16	26	58	46	50	15	2	7	0	4	7	6	0	0	7	4
7.	0	11	22	16	33	52	37	43	0	26	32	29	16	11	5	7	50	0	5	3

In reviewing the results of the identical seven questions across all the survey opinions the mean score indicated a somewhat favorable response for all groups except the teachers. Regarding Question 7: "There are enough experiments in the Windows on Science® to help the student learn," the teachers did not feel there were a sufficient number of scientific experiments to help the students learn. As indicated in Table 5, 50% of the teachers strongly disagreed and 16% disagreed, whereas 33% agreed there were enough experiments.

The conclusion drawn for the research question addressed through the identical questions contained in the surveys was positive. The most positive questions were Question 3: "I often use the new Windows on Science®" (4.24); Question 1: "I enjoy Windows on Science®" (4.14); and Question 6: "I feel notes taken from Windows on Science® are helpful when learning the material" (4.00).

CHAPTER V

Summary, Findings, and Recommendations

Summary

This study focused on determining if the students grades 3 through 6 and teachers grades 1 through 6 liked teaching and learning with the new Windows on Science® program more than teaching and learning with standard science textbooks. This was accomplished by conducting a survey of the above mentioned groups. Analysis of the survey results provided scores that reflected ratings from very favorable to very unfavorable to be made regarding items for each group.

In determining the student and teacher preceived popularity of the Windows on Science® program at Meyersville School during the 1991-1992 school year, a thorough review of the literature and research concerning teaching with science textbooks and teaching with Electronic Information Media Systems (EIMS) was completed. As a result this study identified areas of strengths and weaknesses using the Windows on Science®.

Findings

In reviewing the results of the surveys, all groups tended to have a favorable preception of using the Windows on Science® at Meyersville School.

specific areas were identified by the surveys as being lower than other areas.

The Teacher Opinion Survey identified that one area lacking in the Windows on Science® programs was not enough experiments to help the students learn (2.17). Five of the six teachers surveyed rated the Windows on Science® program as Very Favorable (3) or Favorable (2), and one was Undecided. This was the same vote taken by the same teachers when they adopted the Windows on Science® program in the Spring of 1991.

In comparing the Male/Female Survey of the Windows on Science®, the males rated the Windows on Science® higher than their female counterparts on all seven questions. The males also rated the Windows on Science® higher on all questions on the survey than the teachers.

In reviewing the seven identical questions for the three groups, all mean scores except one showed a favorable response to Windows on Science®. The mean scores for seven questions with the males was 4.07, females 3.79, and combining males and females 3.93. The teacher mean score for the identical seven questions was 3.74 which was the lowest of all three groups. If, however, one removes the mean score of

Question 7, (There are enough experiments to help students learn the Windows on Science®) (2.17), the teacher mean score would be 4.00 but still not as high as the male students (4.07).

Recommendations

In reviewing the findings of this study one obvious fact has emerged: the teachers and students at Meyersville School like the new Windows on Science® program better than the standard science textbooks for teaching and learning science. Some of the areas questioned on the surveys indicated lower responses than others but the mean scores were very high.

In order to improve upon the existing program at Meyersville School, the teachers are going to make a concerted effort to find other science experiments that will help the students learn Windows on Science® more easily and to supplement the regular Windows on Science® experiments. As this was the first year for the teachers and students to utilize the Windows on Science® program, the teachers should be more familiar with the program and do a better job in teaching this coming school term.

Windows on Science® is also sponsoring workshops called "Teaching Tips" using the Windows on Science®

program. All the teachers using Windows on Science® at Meyersville School should attend these workshops.

A one-year survey concerning the effectiveness of the Windows on Science® program is certainly nothing more than an indicator regarding the program. Such surveys should be continued for four more years. Also science test scores should be compared for five years as some substantial results could be gained.

The recommendations provided in this study represent the framework to improve Windows on Science® at Meyersville School. Specific areas needing improvement have been identified, with the overall goal to produce a better Windows on Science® program.

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APPENDICES

Appendix A

Student Windows on Science® Survey

Effects of Windows on Science

Student Window on Science Survey

Please provide the following information.

Name ______________________________ Age ______ Grade ______

Teacher ______________________________ Male ______ Female ______

Years your teacher has been teaching ________________

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

Please answer the following questions about your new Windows on Science:
(Circle one answer per question)

1. I enjoy Windows on Science.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

2. I do not enjoy the new Windows on Science.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

3. I have difficulty understanding my new Windows on Science.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

4. I do not have any difficulty understanding my Windows on Science.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

5. My teacher often uses the new Windows on Science.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

6. My teacher seldom uses the new Windows on Science in my Science class.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

7. My new Windows on Science is hard to understand.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

8. My new Windows on Science is more easily understood than the Science book.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

9. My new Windows on Science is more easily understood than my old Science book.

   Strongly Agree Agree Undecided Disagree Strongly Disagree

10. Windows on Science is more difficult to understand than my old Science textbook.

    Strongly Agree Agree Undecided Disagree Strongly Disagree

11. I regularly write notes about the subject matter in the Windows on Science.

    Strongly Agree Agree Undecided Disagree Strongly Disagree

(cont.)

12. I do not regularly write notes about the subject matter in the Windows on Science.
    Strongly Agree   Agree   Undecided   Disagree   Strongly Disagree
13. I feel these notes are helpful in learning the material in the Windows on Science.
    Strongly Agree   Agree   Undecided   Disagree   Strongly Disagree
14. I do not feel taking notes is helpful in learning the material in the Windows on Science.
    Strongly Agree   Agree   Undecided   Disagree   Strongly Disagree
15. We have enough experiments in the Windows on Science to help me learn.
    Strongly Agree   Agree   Undecided   Disagree   Strongly Disagree
16. We do not have enough experiments in the Windows on Science to help me learn.
    Strongly Agree   Agree   Undecided   Disagree   Strongly Disagree
17. I do not like science taught from Windows on Science.
    Strongly Agree   Agree   Undecided   Disagree   Strongly Disagree
18. I do not like science taught from the science book.
    Strongly Agree   Agree   Undecided   Disagree   Strongly Disagree
19. I do not like science.
    Strongly Agree   Agree   Undecided   Disagree   Strongly Disagree
20. List three things I like or dislike about the Windows on Science.
    (1.)

    (2.)

    (3.)

Appendix B

Teacher Windows on Science® Survey

EFFECTS OF WINDOWS ON SCIENCE
TEACHERS WINDOWS ON SCIENCE SURVEY 2

Circle SA if you STRONGLY AGREE with the statement
A if you AGREE but not strongly
U if you are UNDECIDED
D if you DISAGREE
SD if you STRONGLY DISAGREE

1. I enjoy Windows on Science.
   SA A U D SD
2. I would rather have science taught from the textbook.
   SA A U D SD
3. I believe my students understand the new Windows on Science better than from the textbook.
   SA A U D SD
4. I have used the new Windows on Science consistently throughout the year.
   SA A U D SD
5. I think the Windows on Science is more easily understood by my students than the science textbook.
   SA A U D SD
6. Students are forced to be better note takers when learning with the Windows on Science.
   SA A U D SD
7. I feel these notes are helpful for the students in learning the material in the Windows on Science.
   SA A U D SD
8. There are a sufficient number of scientific experiments to help learn with the Windows on Science video.
   SA A U D SD
9. I have taught more science lessons using the Windows on Science than with the standard textbooks used in previous years.
   SA A U D SD
10. I want to continue to use Windows on Science to help me teach science next year.
   SA A U D SD
11. How do you keep the fast note takers busy while waiting for the slow note takers ?

12. How do you get the absentee students caught up when the lesson has been taught with the Windows on Science ?