1993

Creating a child-centered integrated science/language arts curriculum using a year-long theme

Isabel Ann Pickett

CREATING A CHILD-CENTERED INTEGRATED SCIENCE/LANGUAGE ARTS CURRICULUM USING A YEAR-LONG THEME

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Education: Reading

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ABSTRACT

With the push for teachers to integrate the curriculum, and conceptual change taking place in elementary school science teaching, teachers are searching for new strategies to help achieve a curriculum which is balanced, integrated, and science-rich. Science education in the elementary school has been haunted with problems. Poorly written textbooks, lack of teacher preparation, poor programs of implementation, time constraints and multiple pressures have made elementary teachers feel uncomfortable teaching science. The Integration of science and language arts is a natural process because language is the medium in which all subjects are cast. Reading and writing are the major vehicles for gaining access to knowledge in other areas.

This project was conducted with the premise that children are interested, responsible learners. When they are given the opportunity and freedom to express their interests and needs, meaningful curriculum is created.

The purpose of this project was to attempt to prove the premise, invite second grade students to help create a collaborative, integrated curriculum by developing a year-long science theme cycle and filling in the blanks with their interests. This project promotes the idea of a whole language philosophy as one of change.

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STATEMENT OF THE PROBLEM

Science is all around us. It is a part of our every day lives, yet some elementary school teachers experience difficulty providing a viable and adequate science program. For decades the lack of elementary school science has been coupled with excuses and explanations of poor teacher attitude, lack of community support (Morely, 1990), lack of time and money (Johns, 1984), inappropriate pedagogy (Stronck, 1984), inadequate teacher preparation and poor textbooks (Staver & Bay, 1987). Shymansky, Yore, and Good (1991) focused on elementary school science and found that school science instruction is driven by textbooks, science is not a high priority, little instruction time is allotted and many elementary teachers feel uncomfortable teaching science. A study conducted in Monterey County elementary schools resulted in these significant findings: (a) teachers felt they did not have the training required to teach science, (b) they did not have access to appropriate materials, and (c) teachers did not have the strategies or time for integrating science into their overcrowded days (Green, 1991).

The problems of past decades continue to haunt our present day science programs. Wallace and Louden (1992) maintain that the problem is not with the quality of the teacher, but with poor programs of implementation. In their

study of science teaching and teachers' knowledge, Wallace and Louden (1992) found that teachers acknowledged the need for reform in the teaching of elementary school science. They also discovered that elementary school curriculum is overloaded by subjects which demand an equal and often greater effort and time requirement by teachers and students. Teachers generally accept the multiple pressures and time constraints as part of their duties; however the consequence is the small amount of time spent on each content area.

Teachers are continually searching for new ways to present quality science to their students. At the start of each school year, many students are asked to fill out an interest inventory. In these inventories students almost always include science topics. "The natural world piques their curiosity and provides a great place for learning to begin" (Lynne & Mechling, 1991, p.35). The problem that faces teachers is one of making science relevant to students' lives. "Children are intensely conscious of themselves and the world they live in. Children are naturally curious too" (Demchik, 1988, p.67). Having children who are eager to learn is half the battle. When science is presented in ways that are meaningful to students and they can connect it to their own lives, learning takes place.

The use of thematic teaching has become a popular way of integrating curriculum. With the emergence of the whole language philosophy, some teachers have begun to share the control of the classroom with their students. They arrange the classrooms so children have opportunities to interact with each other and they recognize that all children are not alike. Curriculum is shaped and modified to fit the needs of the student, not the teacher, and learning is taking on a whole new dimension.

Putting the child first is not a new concept. John Dewey (1943) stated that schools could adjust school to the learners, or they could require learners to adjust to the single narrow school curriculum.

Yager and Hofstein (1986) suggest that the human being will serve as the organizer of the curriculum instead of the structure of the disciplines. Current problems and social issues will serve as the backbone of the curriculum. Who is better equipped to bring current problems and social issues to the classroom than the students? They bring their idiosyncrasies and personal experiences to the learning situations and these experiences have a profound effect on the development of the curriculum.

Teachers have long faced the overwhelming task of presenting a number of curricular areas in a short amount of time. Some have found integrating curriculum efficient and motivating. Integration is a key principle for language

development; otherwise language development and content instruction becomes dual curriculum for the teacher (Goodman, 1986). Using literature as a vehicle to introduce science concepts helps to weave the curriculum into experiences in which children can grasp and enjoy scientific ideas and link facts with meaningful points of interest in their own world (Cousins and Prentice 1989).

The English-Language Arts Framework for California Public Schools Kindergarten through Grade Twelve (1987) mandates the use of a literature-based approach to reading and learning. This approach includes: (a) quality children's literature as the core of the curriculum, (b) students' engagement in reading and writing using the whole language approach and (c) teacher involvement in selecting the reading books.

Aligning with the emphasis of reading and writing across the curriculum and other major tenets of the language arts framework, the Science Framework for California Public Schools Kindergarten through Grade Twelve (1990) encourages the use of a thematic approach in the teaching of science. The framework recommends broad themes that represent the physical, earth and life sciences. Facts are only useful when tied to larger theoretical questions of the natural world-how it works and how its parts fit together.

To develop the conceptual and theoretical base and integrate language arts with other content areas, the

teacher can identify a broad theme for the year and develop the major components on an on-going basis as the students make connections. Choosing to use a year-long science related theme will let the teacher and students build on the concepts which are emphasized in the state frameworks, not only in science but in all content areas. Combining the objectives of both frameworks is a concise, effective path to authentic learning and constructing a meaning centered curriculum. All areas of language arts are interwoven (listening, speaking, reading and writing) into other curricular areas.

Supporting the integration effort of language arts into the content areas is the document which was published by the Commission on Reading, Becoming a Nation of Readers (1985). It specifically states that reading and thinking strategies integrated in the social sciences and in science, rather than separate lessons about reading are the logical place for instruction.

Science is another excellent vehicle for teaching and reinforcing processes common to other curricular areas. Classifying, comparing and ordering are shared with math and language arts. Collecting data and interpreting graphs are useful in the social sciences. Hands-on activities generate vocabulary beyond everyday conversations, and experiences students engage in give meaning to words. Many activities may use manipulatives which provide opportunities for

children to refine their observations and communicate these observations to others.

Using science as the focal point in a theme cycle opens up new meaning systems to children of diverse cultures. The state of the world is a global issue. We all have a vested interest in its future. Hands-on experiences promote authentic oral and written conversation between students, regardless of their cultural diversity.

This project will present the personal experience of a teacher and second grade students creating a child-centered, integrated science/language arts curriculum, the assessment choices in use and three specific sections of the collaborative year-long theme cycle. These sections will reflect how language arts and science can be successfully integrated and how, when children are given the opportunity and freedom to express their interests, meaningful curriculum is built. The sections will contain the main concepts which were discovered, some activities the students' engaged in, potential resources, and annotated bibliographies of the literature gathered by the learners. A separate appendix will contain outlines extrapolated from the English-Language Arts, History/Social Science, Mathematics and Visual and Performing Arts Frameworks for California Public Schools Kindergarten Through Grade Twelve. The outlines are to help focus on what the State of

California mandates students in grade two should be exposed to.

THEORETICAL FOUNDATION

A classroom that is structured around student/teacher generated curriculum can only take place if there is a strong belief that children are at the heart of teaching and learning. Dorothy Watson's definition of curriculum in Defining and Describing Whole Language (1989) maintains that curriculum is everything that goes on in students' heads and what potentially can go on in students' heads.

Whole language is a philosophy of change. Children are viewed as experimenters (Harp, 1991). The teacher's role is facilitator, collaborator, observer and fellow learner. The whole language student is valued. Each one comes into the classroom with a set of beliefs, interests, values, needs, learning preferences and culture. A teacher's deep concern for learners is the focal point. "Whole language involves whole learners (with all their strengths and needs) who, when given real and continuous opportunities in safe and natural environments, can initiate learning, generate curriculum, direct their own behavior and evaluate their own efforts" (Watson, 1989, p.133). Teachers empower their students to make choices about what they learn and how they demonstrate their learning.

A whole language philosophy embraces innovative ideas about learning. It is one of complexity and reform. It allows teachers to "risk challenging the theorists and

experts, because in their own classrooms they are in the business of theory and curriculum making" (Rich, 1985, p.717). It is a shift in the way in which teachers think and practice their profession. It is not a "generic offering of some specific teaching/learning strategies which are delivered according to a whole language formula" (Rich, 1985), or pre-packaged materials which claim to be made for a "whole language program". Once curriculum is written down for others to follow, it ceases to be whole language. The curriculum that was generated by one group of students may not be right for another. Each year will bring a new set of interests, needs, strengths and goals. What whole language does is give teachers focus on the importance of a child-centered curriculum. As teachers make a curriculum choice, they must decide whether to rely on a fixed curriculum or to begin where the learners are and join with them to build a curriculum that centers around their needs and interests.

A graphic view of whole language is conceptualized as a sphere with meaning at the center. Emanating out from the center is something new being generated. Meaning is relative to whoever is engaging in the experience. Change takes place each time a different person encounters a particular activity.

Within the whole language philosophy is the belief that learning takes place when children have ownership of their learning. They must be allowed opportunities to make

choices and have some control in the direction of their learning.

Through the use of a year-long theme, students and teacher can plan together what activities to undertake and how to accomplish them. Harp (1991) maintains that the teacher is responsible for supporting the students' efforts through observation, questioning, guiding and inviting.

As a facilitator, the responsibility of a teacher is to "plan to plan" the curriculum. This involves correlating concepts which the California State Frameworks set for a particular grade. The teacher must brainstorm invitations which may enhance those concepts, arrange materials for hands on experiences, collect media resources (related literature, films and videos), contact specialists who may add meaning to the concept, arrange any field trips that will help create or maintain interest, and have a foundation in place for assessment. Once the structures are in place, students will fill in the blanks of the curriculum and validate a teacher's plans by their learning interests.

This project is based on the belief that children want to learn. They are excited, motivated and responsible. They have the ability to move beyond the point of using teacher controlled curriculum and they can explore, discover and expand their knowledge far beyond set expectations.

REVIEW OF THE LITERATURE

It is believed that children learn best when language is manifest in all of its completeness rather than being divided into separate parts (Shanahan, 1991). Today's education research focuses more on students than on teachers. With the emphasis on the learner, we find that learning is an active process occurring within and influenced by the learner and "all learning is dependent upon language and communication" (Yager, 1991, P. 53).

The scope of this project required an indepth study of the current literature regarding child-centered curriculum, integrated curriculum, thematic approaches and a look at specific programs which have integrated science and language arts. The current literature indicates a need for conceptual change. Science and reading have traditionally been taught using textbooks and workbooks. Subject matter is broken down into isolated parts which have little meaning and relevance to a child's life (McCutcheon & Burton, 1981). "The universe is not a mechanical multiplicity of things. It is a single dynamic unity" (Lucas, 1985). When content areas are broken down into separate subjects, we convey to children "a world of knowledge unrelated to meaning and a world in which outcome is independent of process" (Crowell, 1989, p.61).

Child Centered Curriculum

A whole language philosophy is an excellent example of how conceptual change is taking place. The concepts of integration, complexity and holism are central to this approach. Process and content are intertwined, as are the student and learning (Crowell, 1989).

"Whole language brings together the scientific understanding of language, learning, teaching, curriculum and learning community to provide the means of effectively educating all learners" (Goodman, 1992, p. 198). Goodman goes on to state that whole language is inclusive, coherent, and a scientific pedagogy for a truly democratic society. One important factor in a whole language classroom is the idea of democracy. Children need to be able to express their interests and needs and be recognized as viable responsible learners. They have rights in the classroom, just as the teacher does. Watson (1989) maintains that students are at the heart of teaching and learning. Teachers are advocates for students, for themselves, and for curriculum. "Curriculum is everything that goes on in students' heads and what potentially can go on in students' heads" (p.133). In keeping with this philosophy, curriculum is developed when teachers (based on what they learn about their students and what they know about the content areas) and students collaborate together to meet their needs, interests and learning preferences.

In a child-centered classroom the teacher structures the environment so children can take the lead. It isn't always possible to know in advance where the lead will take the children and the teacher (Harp, 1991). Even though teachers provide students with time to read, write and explore their interests, this is not enough. Teachers have to empower their students to become whole learners.

Whole language does not mean the curriculum is random or unstructured. Teachers who believe in a holistic approach understand that much thinking, planning and organizing goes into a child-centered, integrated curriculum. Teachers must teach, but making decisions about what to teach and when to teach can be difficult (Siu-Runyan, 1991). Whole language provides a framework for children-based rather than teacher-based classroom instruction. Large bodies of research and theory have been published with clear implications for classroom teaching. Rich (1985) suggests the need to provide open-ended classroom activities in which written language functions as it does in the real world. Rich is an advocate of having materials in a whole language classroom fit the needs of students rather than have students put through meaningless activities to accomplish someone else's identified objectives. Peer interaction along with student-teacher interaction is essential to the whole language environment (Edelsky, Draper, and Smith, 1983). Graves (1983) has

demonstrated that children who are writing in an environment where they are surrounded by literature are learning to read as well as other children who learn to read through the basal reader, and at the same time are learning to write. Cunningham's (1986) opinion is that classrooms are places where children learn concepts and the language to talk, read and write about them.

Teachers have to become observers of children. Yetta Goodman (1987) stated that "good teachers have always been kid-watchers" (pp.44-45). The best evaluation technique comes from direct and in most cases, informal observation of children in various situations by the teacher. Goodman (1987) suggests teachers look for mistakes, errors and miscues to provide knowledge about children's language responses. Those miscues can tell us what children know, what they are struggling with and what we need to teach them. Goodman also suggests teachers ask their students what they want to learn. In a cooperative research project conducted by Jane Hansen, Don Graves, and Bill Wonsert (The Colorado Communicator, 1989) it was discovered that children are cognizant of and can articulate what it is they want to learn about next about reading and writing. Hansen warns teachers that if they ask students what they want to learn, they need to take the answers seriously and honor students' requests:

> ...if we ask them these questions, and then go and do something different when we work with them, the

> children will quit answering our questions because they'll think to themselves, "Why are you asking me what I want to learn next? You're not going to do anything about it anyway." Asking kids these kinds of questions is really important to teaching. I'm wondering how in the world I had ever taught before because I didn't ask students what they wanted to learn, nor did I ask how I could help them. So, I was making all these guesses and I was guessing things very differently. No wonder school didn't seem to be all that meaningful. (p.21)

When teachers are sensitive to their students' needs, they become more than teachers. They become fellow learners in an ever-changing world.

Gordon Wells (1986) believes that children are predisposed to make sense of their experiences. When observed outside of school, they pose problems for themselves and actively search for and find solutions. He believes then, that given the opportunity, children will continue to show these characteristics in school as well, provided the tasks they engage in are ones they have been able to make their own. They will function effectively when they have a personal commitment, either because the goal is one that is intrinsically satisfying, or it is one they are determined to achieve, or both. Learning will take place when children have ownership of the curriculum. It becomes relevant to their lives because they have made choices in the direction of their learning.

Whole language encompasses the idea that students do not all learn in the same way. Every person has at least some preferences which are the result of many influences

(Dunn, Beaudry & Klavas, 1989). Certain learning fashions are biological and others are developed through experiences (Restak, 1979). Many characteristics come into consideration when determining students' learning preferences. Sound, light, temperature, mobility needs, motivation and structure are but a few. It is ludicrous to believe that children should learn to adapt to their teachers' preferences instead teachers providing an environment for children to use their own learning characteristics. John Dewey (1943) stated the choices the schools faced: They could adjust school to the learners or they could require learners to adjust to the single narrow school curriculum. Dewey's view of the classroom was one that saw it not as preparation for life, but as life itself. Learning is both personal and social. Frank Smith (1992) views learning as "continuous, spontaneous and effortless... Learning occurs in all kinds of situations and is not subject to forgetting. Learning is social rather than solitary" (p. 432). Vygotsky (1978) emphasizes the social and functional aspect of learning and language development. He states that learning occurs "only when a child is interacting with people in his environment and in cooperation with his peers" (p. 90). Optimum learning occurs when learners are engaged in functional, relevant, and meaningful experiences. Teachers have made progress in adjusting to the full range of learners, even to removing

the barriers to handicapped students having full access to education (Goodman, 1992). Loper states (as cited in Dunn, Beaudry, & Klavas, 1989) that if teachers teach and evaluate in only one cognitive mode, they are serving only those students who prefer to learn in that mode. To give all students access to learning, teachers have to expand their repertoires to include a variety of cognitive modes. Smith (1992) maintains that not all children learn what we want them to when we want them to learn it. "Children are individuals, no more capable of being standardized than are adults" (p. 441). What teachers can do is promote interest, create an environment that accommodates children's learning preferences and be sensitive observers, facilitators and learners. They can create language-rich classrooms where children are invited to explore, create, experiment and take risks. Teachers intentionally structure an environment that deliberately adopts a more "egalitarian, participatory mode of interaction with students in an attempt to empower learners" (Slaughter, 1988, p. 30). Understanding how children learn will help teachers begin to view their students as responsible citizens, who can make educated choices about their own learning.

Integrated Curriculum

Language is learned through use. It is not a subject like history, science, geography, math or social studies

because it comprises all these. Language is the medium into which these subjects are cast. Reading and writing are the major vehicles for gaining access to knowledge in other content areas. One of the most fundamental integrative principles is that language learning is optimal when it is situated in meaningful contexts. Children's doing, their active social experiences and their own thinking create the occasions for becoming more perceptive learners (Busching, 1983). This is not a new concept. In 1939 Meriam proposed that language arts be abandoned as a school subject: "It is a favorite remark of mine that the best way to teach language arts is not to teach them at all as such, but proceed vigorously to improve those activities in which these language arts function" (p. 118). The California English Language Arts Framework (p. 19) maintains the importance of a language arts curriculum for all students, from kindergarten through high school, that includes numerous opportunities for students to read and write in meaningful contexts. Time should not be wasted on learning skills in isolation or filling pages in workbooks. Instead time should be used in search of meaning making curriculum.

One model of integration views curriculum through a kaleidoscope: "interdisciplinary topics are arranged around overlapping concepts and emergent patterns and designs" (Fogerty, 1991). This model finds the overlapping concepts, skills and attitudes of the content areas and students and

teachers make connections among them as commonalities emerge. Fogerty calls this the "whole language strategy in which reading, writing, listening and speaking skills spring from a holistic, literature-based program" (p. 64).

Brozo and Tomlinson (1986) found the use of literature in conjunction with content areas made a subject more interesting, memorable and comprehensible to children. Literature helps in sparking the children's interest in other subject areas which in turn increases the amount of learning. While conducting research on literature, Hennings (1982) noted that many children's books reflect the basic concepts of the social sciences. Smardo (1982) found that children's books which deal with scientific concepts can help children understand and distinguish between what is real and what is imaginary. Fictional books can be used to stimulate interest in topics which may not happen faced with a textbook. A particular piece of literature may be an invitation to explore the areas teachers want to guide their students through. Franklin (1988) sensed that as children began to develop meaning about a subject they often used features from a variety of texts to support their beliefs. The texts included fictional and nonfictional material. Barbara Moss (1991) found many advantages of using non-fiction tradebooks in the content areas. Teachers can individualize content area reading instruction by providing materials that are close to children's reading levels.

Elementary children will often prefer quality literature to textbooks because of the visual and content appeal. Children are often attracted to interesting cover designs and colorful graphics which influence their choices. Non-fiction literature can provide indepth information on particular content area topics ranging from people and places to scientific processes. Through the reading of particular topics, children will learn the concepts and terms associated with that topic. Non-fiction trade books can contain information arranged more logically and coherently than it is in some content area texts. Textbooks can be full of factual information which can confuse and confound children to the point they no longer want to read them. Since literature is published every year, it is more current than textbooks which are revised every five to ten years. New books reflect the latest developments in science as well as world events, and they are accessible to teachers through libraries and other sources.

Using literature to integrate the curriculum can make information more exciting and relevant to learners. If teachers are expected to develop "a nation of readers" they must expose children to many genres of fictional and non-fictional materials which will capitalize on their natural curiosity and build informed citizens who are knowledgeable about content area subjects and "help ensure that today's

children will not become tomorrow's illiterate or alliterate adults" (p.31).

Busching (1983) stated "Neither efficiency nor effectiveness is served by learning to read and write from 9:30 to 11:00 and learning about history and geography from 1:30 to 3:00" (p. 22). Efficiency has been a cross teachers have had to bear for years. "How will I be able to cover all this extra material when I know I have to teach reading, writing, and spelling. I do not have time to cover another subject area." These are the cries that echo through the halls of institutions everywhere. Teachers have been pressured to teach more subject areas than time has allowed. This was because the subject areas were treated as separate entities. Each had its own time slot and everyone involved knew what was happening when. This does not have to be the case any longer. Moffett and Wagner (1983) suggest that integration is very practical. It means including as part of an integrated curriculum many reading materials such as periodicals, games, books that represent different genres and visuals which draw subject matter from all content areas. The materials do not have to be formally presented, but made available for use within an individualization system. Roehler (1983) maintains that integrating the curriculum allows subject matter to be combined to allow one subject matter aid in the learning of another and as such integration is both efficient and effective. Vars (1991)

proposes that the ultimate in a child-centered integrated curriculum is one in which students and teachers together develop the units of study. They jointly decide on specific questions of study, how the unit will be carried out and how student progress will be evaluated. This theory is aligned with a whole language philosophy of a child-centered integrated curriculum.

Integrating Science and Language Arts

The evidence that elementary school science teaching is in need of reform has already been established. In many classrooms science is still taught as a cohesive set of facts to be absorbed, and children are viewed as blank slates on which teachers are to fill (Watson and Konicek, 1990). A survey conducted by Shymansky, Yore and Good (1991) indicated that elementary teachers did not consider reading to be a particularly effective way to teach science, yet despite this belief most elementary teachers use textbooks as a major component of their science instruction. They maintain that teachers prefer a structured program with instructional resources that are very explicit, including what questions to ask and what demonstrations and enrichment activities to include. Armbruster (1993) reflected that teachers have had little preparation in the teaching of elementary school science and so are uncomfortable teaching it. She states that teachers "need to be better prepared to teach science and reading-to-learn in science or someone

needs to help them correlate trade books with their science curriculum" (p. 347).

The push in science education is for a "hands-on/minds-on" approach for deeper understanding of science concepts. Children come to school with misconceptions which may not be addressed by using only one mode of instruction. Teachers who use primarily hands-on activities which are "done" but not explored by the students emphasize products of science, but not processes. Hausfather (1992) maintains that children come to school with clear and reasonable ideas and intelligent ways of making sense of the world, yet their ideas may be scientifically inaccurate. Their theories are based on what they have felt and seen, the language they use and on their reasoning ability. These misconceptions can be very difficult to change using only textbooks, or only hands-on science. Hausfather sets up a framework for conceptual change. He promotes the use of hands-on experimentation coupled with extensive discussion. "By probing students' ideas you begin the process of conceptual change" (p. 22). Teachers have to push students to clarify their theories and they will soon notice differences between their ideas and those of their peers, and they can propose ways to distinguish good theories from bad.

The need for new programs of implementation is at hand. Research indicates learning takes place when information is interesting and relevant to children regardless of the

content area. Learning takes place when ideas and concepts are connected to one another, not isolated and fragmented. In Watson and Konicek's study on teaching for conceptual change (1990), they found several strategies which can help teachers promote new thinking patterns and allow more effective learning to take place.

These include:

1. Stressing relevance. The teacher must help connect new concepts to the children's everyday lives.

2. Making predictions. This asks students to link their new knowledge with what they already know in order to form hypotheses.

3. Stressing consistency. The development of logical, consistent thought is a by-product of teaching aimed at conceptual change and developing an orderly view of the world can prevent isolation of knowledge.

Science and language arts are complementary aspects of the elementary curriculum. Language arts addresses the use of language as a tool to explore, create, express and communicate thoughts, feelings and experiences. Science uses cognitive processes to make observations and create understanding of the natural world. The observations that are made need to be recorded and communicated with others. The integrated teaching of these two disciplines are an effective way to encourage growth (Colvin & Ross, 1991).

Jeanne Brunworth (1988) believes that by helping children become better scientists, we help them become better readers. Brunworth integrated science into her reading skills lessons. She found that children were more interested in printed words and their order in sentences and children were highly motivated because they did not know what each day might bring. The integration of science experiences into the basal lessons is one way to motivate students to be better readers.

Science and reading are similar in several ways. Both require children to use visual and auditory skills, and science requires tactile skills as well which can make reading more exciting and allows flexibility in accommodating children's learning preferences. Order and logic figure prominently in science and reading. Through science experiences children can gain the necessary order and logic to facilitate better reading attack processes. Science and language arts are inquiry-oriented subjects. Children use their curiosity to explore science concepts and language arts skills to apply their knowledge to their daily lives.

Barrow, Kristo and Andrew (1984) suggest language experiences as a way to build an understanding of science concepts, where children's experiences provide science observations that are recorded for reading and extension activities. Science is a natural way to increase children's

backgrounds of experiences. The activities engaged in may use manipulatives to provide for preoperational and operational children to refine their observations and then communicate these observations to others. These types of activities can motivate students toward reading in the search for answers about their observations.

Engaging in science activities allows children to expand their own experiences including vocabulary and comprehension of science concepts. In science/language experiences children can "discover that science can be fun as well as informative, while at the same time develop and practice reading skills in meaningful ways" (Barrow, Kristo & Andrew, 1984, p. 191). Integrating science and language arts allows for the development of science skills and concepts such as classification, observation, organization, inference, prediction, measurement and data collection, while stimulating children to ask questions and respond through listening, speaking, reading and writing.

Scarnati & Weller (1992) promote the idea of hands-on activities being perfect for integrating science and language arts. Activity-based science can be a great equalizer among children "Regardless of social, economic, academic or ability differences, since students share the same learning experience during an activity, they have a common knowledge based upon which to build and develop language arts skill" (p. 28). They propose that the four

purposes of writing , narration, descriptive explanatory and persuasive, can be successfully integrated into science. Narration features observation, inference and sequencing. It can be used to describe real-life events such as adventures of explorers or the environmental crises that faces the world. Descriptive writing requires detailed observations and descriptions in the world of scientific communication because they focus on facts. Explanatory writing can introduce concepts or process in specific steps; the how and why of an event. Using persuasive writing can create new sympathies, insights or perceptions. "Combining science and language arts creates a more interesting and meaningful learning environment in the classroom and subject integration uses class time more efficiently, encourages dialogue among peers and improves outcomes" (p. 29).

Thematic Approach

The Science Framework for California Public Schools (1990) encourages a "global and integrated understanding of the natural world, which the nature of science describes and defines so beautifully" (p.7). The Framework suggests the use of a thematic approach to science which is derived from Science for all Americans, a report issued by Project 2061 of the American Association for the Advancement of Science in February, 1989. The report envisions a need for a thematic approach to science instruction "to demonstrate the connections that exist among the various disciplines of

science and enable students to understand the rapidly changing world" (Science Framework for California Public Schools, 1990, p.7).

Such an approach provides a scaffold to unite the entire curriculum, avoiding the common fragmentation that occurs with separate, unrelated subject areas. During the past few decades many teachers have organized their classrooms around themes. One common practice has been thematic units. In this approach, teachers choose topics such as spiders or rabbits and organize several subject areas around the topic (Staab, 1991). There have been many idea books published around thematic units. These types of books will contain specific topics and activities which integrate the topics across the curriculum. If teachers want to use ready-made curriculum, these materials will suffice, however this method of thematic instruction does not align with a whole language philosophy of change nor does it align with the science thematic approach. Having students collaborate with teachers to build their curriculum is an integral part of whole language.

A third approach is the use of a theme cycle. "Theme cycles allow teachers and students to work together in using reading and writing to learn, and in developing their own units of study." (Harste, Short and Burke, 1988, p.366). This approach finds out what children know about a topic, generates questions about what they want to know and then

provides children with opportunities to find out the answers to their questions. Students are encouraged to use what they already know to extend learning into the unknown. Together, students and teacher negotiate how they will learn more about this topic. Students select questions they want answered from a list compiled by the whole class and through whole-group, small-group and individual learning activities, explore the theme or topic. At the end of the study, students present what they learned to each other using various meaning systems.

The last process of the use of themes across the curriculum is the concept of a year-long theme. This idea incorporates a broad-based, global theme which blends science, language arts, social studies, mathematics and fine arts. The theme is based on a "big idea" not on an isolated topic. The rationale for a year-long theme was developed by the Mid-California Science Improvement Program based on Susan Kovalik's integrated thematic learning model (Kovalik, 1986). "In this model, teachers are not asked to add another subject to an already crowded day. Instead the program makes science the ingredient that unites all other subjects" (Greene, 1991, p. 43).

Students read and write about science, investigate and solve problems using mathematical skills, and learn about applications of science to their own world. Fine arts enhance and reinforce the thematic approach as children

express their understanding through drama, art, movement and music (Greene, 1991). A year-long theme invites children to share their interests, choose their own assignments and materials, and feel safe in a meaningful enriched environment. This approach combines the use of scientific themes and theme cycles. It focuses on "hands on/minds on" science and a literature based language arts program. Teachers have a wealth of resources to choose from to make a rich, child-centered thinking curriculum for all students.

In conclusion, the need for change is evident. Building a child centered, integrated curriculum is a way in which children's search for meaning can be put to work in mastering all content areas. Using a year-long thematic approach will provide meaningful structure to connect students' learning in all subjects. Students and teachers, together as learners, will inquire into life by using language fully and negotiating curriculum.

In the words of Guillaume Apollinaire:

Come to the edge, he said.

They said: We are afraid.

Come to the edge, he said.

They came.

He pushed them...and they flew.

GOALS AND LIMITATIONS

The purpose of this project is to share one teacher's experience in integrating science and language arts using a year long theme. With the push for a "whole language" curriculum and a hands-on/minds-on science curriculum, there is a need for teachers to understand that whole language is a philosophy of change and elementary science education is in the process of conceptual change. Teachers who are interested in change may use this project as a guideline or personal encouragement to let children be responsible for their own learning. This project provides a high quality, child-centered integrated curriculum, in an environment where children are free to take risks, make mistakes and learn from those mistakes, are given the power to learn and the power to dream. It provides numerous opportunities for children to engage in science/language experiences which helps them make sense of the world, and it provides a hands-on/minds-on integrated science curriculum.

A limitation of this project is that it is not meant to be used, as it is written, by other teachers. This project was engaged to explore the idea of integrating curriculum through a year-long theme. Since the belief behind this project is that of change, it is only valid for the group of students who collaborated on it.

Since this project is an experiment, changes and revisions will take place as needed, which will not be recorded at this time. Teachers may use the ideas, resources and materials generated in the project, however the outcome is very likely to be different than what was experienced by the authors. For teachers to reap the full benefit of this project, they must be willing to examine their own beliefs about teaching, learning and curriculum. They must be willing to change, not once, but continuously. The results will be the opening of doors for themselves and children to grow together in an environment where there is no ceiling on learning.

Another limitation is the focus of this project is only on the integration of science and language arts. Experience has shown that all content areas are able to be integrated as children make connections. To achieve a full balanced integrated curriculum, teachers will have to explore this type of thematic approach for themselves.

EVALUATION

"Evaluation should be a natural outcome of the process of creating meaning, used by the learners to improve performance and by teachers to gauge students' overall progress" (Harp, 1991, p.26). Teachers who believe this evaluate all the time and constantly use the results to guide, plan, and revise what happens in the class curriculum and instruction.

Evaluation is first for the students so that they may understand and watch their own progress. Second it is for the teachers and third it is for the school, district, parents and other teachers to show how a child is performing throughout the year (Harp, 1991).

The California English Language Arts Framework (1987) call for methods of assessment which reflects the purposes of the curriculum; they must integrate all aspects of listening, speaking, reading and writing. "Good assessment practices will include informal daily activities in which students commend each other for their strengths, teachers create environments in which students can succeed and parents support their children's progress as part of evaluation" (p.33).

Evaluation has been and continues to be ongoing throughout this project. The assessment choices have included a variety of formal and informal strategies.

Formal evaluation does not have to be limited to standardized or teacher generated tests, but may include these. Goodman (1986) states that tests can be useful in determining children's strengths and weaknesses. A major limitation to these types of evaluation is that they focus on skills used in isolation. Goodman emphasizes that this type of evaluation does not give an adequate picture of how children use skills. Goodman sees kid-watching as the most reliable means of informal evaluation. Teachers observe students interacting with one another and with literature. Teachers' observations are effectively noted by means of anecdotal records and conferences with students to evaluate new learning by questioning whether students can relate old information to new.

Portfolio assessment is mandated by the school district in which this author works. Portfolios can be an effective assessment strategy by including samples of students' work throughout the year including but not limited to writing and reading samples, art, lists of books read, book and math logs, author's folders, formal tests, students' reflections and anecdotal records.

Personal and reflection journals are used to record personal information, reflections on what students learn and ideas about what they want to know more about. Learning logs are used to communicate how and what students have understood about the concept or unit of study.

One of the most important means of evaluation is not made by teachers, but self-evaluations made by students. Self-evaluation allows children to monitor their own progress. Children who are involved in self assessment tend to be more conscientious about their learning. Allowing children choices about how to present what has been learned helps involve them in their own self-evaluation process.

The success of the project itself is continuously evaluated by watching the enthusiasm generated by the students as they collaborate together with the teacher on the building of the curriculum. The evaluation process consists of the teacher observing the participation and involvement of the students throughout the units of study to determine which parts of the project work and which need revision in order to be more effective.

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APPENDICES

APPENDIX A

ONE TEACHER'S PERSONAL EXPERIENCE IN CREATING CURRICULUM

Introduction...

Since I believe children are at the heart of teaching and learning, they are invited every day to engage in reading and writing across the curriculum. They have the freedom to converse and conference with their peers and teacher. They use language in all its forms in all content areas.

As a teacher, I value the whole student. As children come into the classroom, they bring with them sets of beliefs, values, interests, cultures, needs and learning preferences. I am responsible for helping meet those needs by allowing them to experience the joys of learning. I have the responsibility of presenting concepts to students which build on their learning schemata.

Learning takes place when children are interested and when concepts can be applied to them personally. It takes place when children feel safe to take risks, share, dream, make mistakes and then correct those mistakes.

In planning this project, I considered themes which would give my students a broad view of the world they live in. A science related theme was chosen because science is all around us. Science lends itself to real-life experiences in which children can participate, and there is a wealth of literature, fiction and non-fiction, students read which are already linked to science.

The English-Language Arts Framework for California Public Schools Kindergarten Through Grade Twelve (1987) mandates the use of a literature-based approach to reading and learning. This approach includes quality children's literature as the core of the curriculum, students engaged in reading and writing using a whole language approach, and teachers involved in selecting the literature.

The Science Framework for California Public Schools Kindergarten Through Grade Twelve (1990) encourages the use of a thematic approach in teaching science. It recommends broad themes which represent all of the sciences.

I link science to other disciplines and use a rich variety of literature to extend the concepts including poetry, realistic fiction, historical fiction, nonfiction informational, folklore, nonfiction biography, picture books and textbooks. Numerous other supplemental materials are used including magazines, newspapers, videos, and technological support. Deciding on what materials are used is based on the curriculum my students and I create together.

This project presents my personal experience in creating a child-centered, integrated curriculum by inviting and allowing my second grade students to help plan their own curriculum and assessment choices in use. Included in the appendices will be the framework for three sections of the year-long theme cycle which have been a collaborative

interaction with the second grade students and me. This year-long theme cycle reflects language arts and science successfully integrated and how, when children are given the opportunities to express their interests, meaningful curriculum is built. The sections contain the main concepts discovered, media resources used, and annotated bibliographies of the literature gathered by the learners. A separate section will present outlines extrapolated from the English-Language Arts, History/Social Science, Mathematics and Visual and Performing Arts Frameworks. These outlines have helped me focus on what the State of California expects second grade students be exposed to. With these opportunities open to teachers, I sense science is a natural starting point.

Reflections...

When I graduated from college and began my first teaching experience fourteen years ago, I had never heard the phrase "whole language". I was the teacher who relied completely on teachers' manuals to guide my curriculum planning. All reading and language experiences were generated from the textbooks and not much of my students' or my own interests were taken into consideration, although the students' academic needs were met appropriately for that time and place. I was unaware of it at that time, but educational reform was taking place. Educators such a Kenneth Goodman, Yetta Goodman, Frank Smith, Dorothy Watson,

Carloyn Burke, and Jerome Harste, to name a few, were conducting research and writing about what teachers found useful and successful in their classrooms and John Dewey (1943) had written about reform long before these noteworthy educators began. Dewey believed that school was for the learner and teachers were responsible for making classrooms places where children were free to learn, not funnelled into a narrow school curriculum. He saw school not as preparation for life but as life itself. Even as far back as 1938, Dewey saw that some people thought the only alternative to traditional "teacher in charge" education was a liberal viewpoint where students were in charge. This was frightening back then, and today these types of assumptions continue to be made about whole language. What some do not understand is whole language means collaboration and cooperation. The responsibility for creating curriculum belongs to the students and the teacher. Creating curriculum within a whole language philosophy is not random and unorganized. Much planning, thinking and organizing is involved. I was not taught with this belief as the foundation for learning. I was taught to teach using a skills-based approach in every subject area. All subjects were separate entities. Facts were to be mastered, memorized and regurgitated. If this was successfully completed, learning took place...or did it? The days were structured so that everyone involved would know what was

happening when and where. There was no excitement, no mysteries to solve, no questions to answer and a lot of boredom. Teaching was not at all what I had expected it to be and after two years I had enough and quit. I took a five year break before deciding to tackle the teaching profession again.

This time I came prepared to do battle against boredom. Unfortunately, I wasn't truly prepared. I fell back into the easy use of teachers' manual planning. I was so dissatisfied with myself as a teacher, I decided to go back to school to see if anything had changed. It had.

A time for change...

While I was taking time off, a new philosophy of education had been born, "Whole Language". It was an exciting turn of events, but I was so unsure of myself as an educator and a learner that the process of change was slow. The idea that teachers could relinquish some of their almighty power in the classroom was scary. I had little support from my peers. Most said the students would create such havoc in the classroom that there would be no learning taking place. At least with the old tried and true method of teaching they said, some learning was going on. Test results proved that. No matter how discouraging they were I still felt this new approach to learning had worked for others, so why not me? Frank Smith (1988) was my earliest involvement in the process of understanding real literacy.

He stated that we do not accomplish literacy through the external controls of prescribed programs and formalized tests, but through sensitive teachers who understand the students for whose learning they are responsible. I wanted my students to be literate, enjoy reading and join the "literacy club".

I began slowly by introducing one new idea, journals. Reading and writing on a daily basis was what I wanted to achieve. Don Graves (1981) told us that children want to write. They come to school knowing something about the writing process, have experimented with pencil and paper, crayons, markers and even on computers. Journals were a way for me to find out about my students. It was a revelation. My students had thoughts, feelings, desires, problems and interests I hadn't known about. I found that if I asked them questions, I had better really want their honest answers because that is what I got. I had to be ready to act on their requests. They wanted to write more. These fourth graders had never really had any say in their education and they seemed to want to take full advantage of the small amount of freedom I was allowing them. My students used their journals for reflection, dialogue, and for recording ideas they wanted to write about. I tried to write in their journals once a week. I found that with my own busy life, this was sometimes impossible. Many children did not want me to write regularly, so I ended up letting

the children decide when they wanted me to write in their journals. They would put them in a basket on my desk when they wanted a response from me and I would give them back the next day. Sometimes I would write in them at once, depending on what was happening in the class at the time. If I wanted to communicate with particular children, I would write a message in my journal and give it to them. This worked out well, and I continue to use this method today with my second graders.

From journals I introduced large blocks of reading and writing time. I stretched silent reading to 30 minutes. I thought my kids would revolt. Silent reading was never really popular with this group, but they enjoyed the uninterrupted time. The overall comment was that silent reading time had been too short. Just when the children had settled down to read, the time was up.

After reading Harste, Short and Burke (1988) Creating classrooms for Authors, the authoring cycle became the framework for all curriculum in my classroom. This was the greatest success of all so far in my evolution. My students reveled in the freedom of the writing process. Always before, they had to turn in a perfect first draft which was marked up with the proverbial red pen. They had no opportunity to review, reflect on or revise their writing. No wonder they viewed writing as a chore and not as an important way to communicate.

I was not really confident that this approach would be successful. The students were very noisy and seemingly chaotic. Authors' folder time was like a three ring circus with many activities taking place at one time. Students were engaged in peer editing, silent writing and reading, publishing on the computers, sharing in Author's chair, creating illustrations and various types of bookmaking. To an outsider, it would seem that I had no classroom control, which I didn't in one respect. I was beginning to share the control. I was also beginning to attract the interest of my peers. I talked with excitement about the change taking place in my room. There were some negative reactions from other teachers. I guess my excitement was somewhat overbearing at times, but there were teachers who were beginning to try out the strategies I was using. The writing that was coming from the children was phenomenal. The kindergarten classes were used to children writing their class books, and even individual books, but there had not been anything like this in the upper grades yet. One student in my class who had shown no interest in anything and was in danger of being retained, was finding time to write about motorcycles; something he knew about, but no one had asked him about until now. Even the resource teacher saw major improvement in the child's progress. It was the small successes which encouraged me to move ahead in the changing process.

Moving ahead...

Incorporating child-centered activities was a step in the right direction for me, but it wasn't enough. I was still dictating the curriculum in the classroom. The children were definitely enjoying school more. It was evidenced by their enthusiasm for reading and writing and by comments make by their parents during conferences. A new school year began and I still was not confident enough in my own ability to invite students to plan the curriculum, so I began incorporating thematic units into my teaching. These units consisted of literature about a particular topic we were studying about. For example, if we had a story in our literary reader about whales, I would use prepared "whole language" materials and added literature to achieve a more indepth study about whales. Staab (1991) defined a thematic unit as one where teachers choose the topics and organize several subject areas around the topic. This was better than separating the subject areas, yet the key words here are "the teacher chooses the topic". The children still had no opportunity to express their own interests and desires about their learning.

A deeper study into what whole language means led me to understand that I needed to have a firm grasp on my own theoretical foundation of learning. My steps were at best shaky and the structure of my curriculum swayed with each new idea. Regie Routman (1991) said that in her changing

process she would read a particular educator's work and then teach exactly as that person wrote about it. I also experienced this. It is what Jerry Harste (1989) has called "adopting a guru". I needed to take my own stand and adapt what I read to my own learning-teaching contexts.

Dorothy Watson (1989) stated that "it is not enough to define whole language; educators must make sure that what occurs in classrooms is supported by and consistent with their definition." (p. 131). Watson also discussed the fact that there are materials published that claim to be "whole language" and that these types of materials are in conflict with the research and theories of whole language.

If teachers believe that whole language involves integrating the language arts across the curriculum, then listening, speaking, reading and writing should be used in the teaching of all subjects areas including the hard to integrate math and science. If teachers believe in a child-centered curriculum, it should be obvious to an observer how children influence what happens in the classroom.

My own definition of whole language grew to be a philosophy of change. When students enter the classroom, they come with their own set of beliefs, interests, values, needs, learning preferences and culture. I cannot rely on one set curriculum every year. Different educators have helped me to focus on my definition of whole language and helped shape my ideas of what kind of teacher I want to be.

Harp (1991) maintained that the teacher is responsible for supporting the students' efforts through observation, questioning, guiding and inviting. Goodman (1992) stated that whole language is the "bringing together the scientific understanding of language, learning, teaching, curriculum and learning community to provide the means of effectively educating all learners. Watson (1989) sees whole language curriculum as what goes on in students' heads and what potentially can go on in students' heads. Rich (1985) stated that a whole language philosophy allows teachers to risk challenging the theorists and experts because in their own classrooms they are in the business of curriculum making. Whole language is a philosophy which embraces innovative ideas about learning. It is one of complexity and reform and it is a shift in the way teachers think and practice their profession. Frank Smith (1982) maintained that "the kind of change that will make a difference in schools will not come with better theories or with better materials or even with better-informed teachers, but only with individuals taking action toward change" (p. 190-191). After nailing down how I believe, the next step was to put my theories into practice. If I believe that children are at the heart of teaching and learning, then the classroom had better show proof of that.

Making the leap...

I experienced curriculum designing in a class where I had to write an integrated theme cycle using the theoretical model I believed in. This was a mind boggling task for me because my ideals did not yet match my practices in the classroom.

At this time I came across a piece of truth that inspired me to leap into the unknown. Wendy Hood (1991) said that "whole language teachers are constantly learning. They aspire to do more, to be better, to be more like that other whole language teacher they consider their mentor." (p.xiv). Even though I did not have a mentor who I could pattern myself after in my school, there were plenty of educators whose work I read and admired to help me through the changing process. I also had caring professors who believed in change and encouraged me to take the steps I needed to facilitate change in my classroom.

I wanted to develop a theme cycle where the children were invited to build their own curriculum: a child-centered, integrated curriculum which integrated science and language arts. But in keeping with the philosophy of change, a theme cycle written without student input would not be valid. To solve this quandary, the project was written as a year-long theme cycle describing what might happen if students collaborated on it together with their teacher. It was written with the belief that curriculum

should bring experiences to children that reflect their interests, needs and successes. It was inspired by an article written by Lynda C, Green (1991) about the use of a year-long science theme to integrate the whole curriculum. The year-long theme makes "science the ingredient that unites all other subjects." (p. 43).

Science was an area in which I wanted to expand. It is so complex and important, yet the resources which were provided were not adequate for any indepth learning. Science was a natural starting point for using a year-long theme because children are naturally curious about the world around them.

As the theme cycle was being developed on paper, I often felt lost in a sea of meaningless, unrelated ideas and activities. I questioned my second grade students endlessly about their interests, how they would want school to be if they could run it, and activities they would choose to participate in if given choices. I taught and encouraged these children to use alternate meaning systems to share their understanding of what they read. We experimented with drama, music, art, and dance as well as different genres of reading and writing. All of the experimentation this year was in preparation for me to let go of the last shreds of my ego and let the students become responsible learners. Implementing this theme cycle was not entirely possible for that school year. I had begun the preparation, and these

students benefited from our experiences, but I would have to wait until the next school year began to really put into practice my beliefs. Change takes time. Regie Routman (1991) stated that "change is difficult and risky...The main thing is to begin, to give it a try" (p.4). That is what I did.

The experiment...

The goal I set for myself in this endeavor was to let the curriculum emerge from my students' interests. I would serve as facilitator, observer, resource and fellow learner. I recognized that I had responsibilities set by the school district I work for to follow certain curricular guidelines set forth in the state frameworks, which meant a close look at them to determine just what my second grade students should be exposed to. From there I built a framework to guide the students in their learning process (appendix F). What I didn't want to happen was to only make surface changes with no attempt to develop important concepts and I wanted to move beyond placing a cosmetic band-aid over the curriculum. I wanted to see a real difference from past years in the way the students were approaching learning.

The broad year-long theme of **"LIVING THINGS"** encompassed the world around us. There were unlimited areas in which the children could explore and would be relevant to their own lives. I began on the first day of school by introducing the overall theme to the class. The children

brainstormed areas they would like to learn about. The consensus was that we should begin with ourselves because this was a new year and we could get to know each other better. I had set up a bulletin board with the central theme in the middle. We made a big production of adding the new concept **"YOU"** and connecting it to **"LIVING THINGS"** with a piece of yarn. This was the beginning of a large web that was to eventually come about (Appendix B).

There are certain structures which I sense are important in the development of a strong foundation for a child-centered curriculum. It was my responsibility to make sure these structures were in place so the children had some resources to draw on as they plunged into this new approach to learning.

The "authoring cycle" (Short & Burke, 1991) was introduced immediately with the writing and sharing about ourselves. I shared a story I had written about myself, and let the children explore my own writing folder. The first draft they wrote was about themselves. We took this story through the complete writing process as an example and published our own books, **All About Me**. This activity was engaged in to introduce the children to the complete writing process and allow them to have one finished piece of work to refer back to if needed. I also learned from past experience that once the first piece of work is published, the children feel successful and want to continue to write.

The authoring cycle is a major component of our curriculum. We began with "life experiences". "What has already happened to us is our invitation to the future" (p. 43). Time each day is set aside for uninterrupted personal engagements. We engaged in reading and writing for many different audiences. Authors' folders which contain personal writing of each student are made and kept by the authors. The folders contain drafts, revisions and ideas for future writing. All the students' writing is kept in their folders and is private until they wish to share it with others.

The authoring cycle includes "exploring meaning constructs with collaborative others" (p. 39). Learning is social and in talking with others we understand our own thinking process. Authors' circles are incorporated so children can discuss their own writing with others, ask questions and consider advise given.

Literature groups consist of a few children reading the same piece of literature to explore their understanding of that piece. They can choose to present their understandings through art, drama, writing, music or another meaning system to the rest of the class.

Through "reflection and revision" (p. 41), children have the opportunity to change their writing or interpretations of the stories they have read. They may use

the suggestions by their peers, but always have the last say in their learning.

"Presenting and sharing meaning with others" (p. 42) is an important aspect of the authoring cycle. Deciding what and how to share reflects students' understanding of the function of communication. The children are presented with a number of choices, but are not limited to those. Their own creativity is welcomed and encouraged and then added to the choices for others. "When learners publicly present the meanings they have constructed to others, they experience the satisfaction of successfully communicating with an audience" (p. 44). The students in this second grade class have written and presented plays, puppet shows, painted murals, utilized illustration techniques they discovered in literature, made collages and dioramas, and combined the arts with writing and reading to share the meanings they have constructed with the rest of us. As the children grow and expand their understandings, they show a need for new knowledge about the processes they use. These needs are met through some direct teaching instruction, but within the context of their learning. I take opportunities presented to expand the children's writing techniques and strategies (e.g., punctuation, capitalization, organization of information, note taking, writing dialogue etc...). Marisa, age 8, was writing a play about ants with several other girls. She needed to know how to write the dialogue in play

format and I took the opportunity presented to teach her group. Manida wanted to know how to show someone talking in a story she was writing and this is when a lesson on quotation marks was taught. As the children master certain skills and strategies, they help other students when they are ready to learn them.

Throughout the authoring cycle new ideas are generated which "continue to move learners through the cycle" (p. 45). The children explore the new ideas and new concepts as they make connections within the year-long theme.

Several other structures were put into place which help the students reflect on their learning.

Reader response is used for students to respond to the literature they read by responding to open-ended questions, free-writing, illustrations, and reflecting on personal reactions which reading. Through reader response children go beyond writing a summary or recalling facts. It is used as "a springboard and reference point for group discussions" (Routman, 1991, p. 104). It is an outlet for creativity and promotes critical thinking skills. I use reader response logs to assess what/how the students are learning through their writing to prompts or open-ended questions.

Learning logs are used so students can write about the activities they engage in and record their observations of the animal environments in the class. Learning logs are a valuable tool when integrating science and language arts.

Using these logs I teach students how to follow the scientific processes that are mandated in the Science Framework.

Learning centers are set up by the students and myself to enhance the concept being studied. They give the students new outlets for using creativity and generating new meaning systems. I use the opportunities that arise to teach different mediums in art (e.g., clay, chalk, paints) or puppet making, book making, and how to write a reader's theatre, poetry or play. A science table is set up for children to bring in their own resources and objects to share. Science centers have included a microscope center, pet center, and various experiments, generated by the students and myself, for the children to conduct.

Literature and research groups allow the children to group themselves according to their needs and interests. The students collaborate on the setting up of rules and learn cooperation skills. The benefits of this type of grouping have been cited as "listening skills improve, comprehension improves, at risk/low ability students succeed, social relationships change, students take ownership of their learning and trust is built between students and teachers" (Routman, 1991, p. 128). With these structures in place the children have many opportunities to engage in processes which expand their learning.

As the foundations were laid, it was easier to move on into the inquiry stage of the theme cycle. After our class had written and presented our books about us, we decided the natural step was to find out about our bodies. We began with the skeleton, moved on to important organs, our senses, and how to keep healthy. Fiction and non-fiction literature was gathered on these subjects from the library and from the children's and my own collections. We ordered films and videos together, invited the school nurse, a parent who is a doctor, and a parent who is a nutritionist to come and answer some of our questions. We engaged in integrating activities such as measuring our bodies, graphing results, researching and writing reports, planned and cooked a balanced meal, made detailed illustrations of our skeleton and internal organs, used the microscopes to observe tissue samples and germs and engaged in activities to explore the five senses. We explored every avenue the students wanted to and brainstormed and participated in activities that were not only interesting and fun, but also developed the important concepts and provided opportunities for transfer of knowledge and skills.

Life is not always perfect in our class. Many times when I read articles about other teachers' experiences, they do not mention the times when everything goes wrong or falls apart. I sense it is because most teachers like to focus on their successes and not their failures. Realistically,

there are days when I have to stop everything and teach a lesson on following directions, being respectful, and remind the children of what their boundaries are. If one or two students disregard the rules, they can disrupt the entire class. The students and I set up the rules and boundaries the first week of school. They worked in groups of four to write which rules they thought we should follow in order to have a successful year. Each group presented their rules and the class agreed on which ones we would follow. The rules for this group are:

1. Be respectful of others.
2. Keep your hands to yourself.
3. Follow the school rules.
4. When your neighbor is working quietly, leave him/her alone.
5. Do your best at all times.

If I had made up these rules myself, I sense the students would not be so willing to follow them. We found that there are many small rules which come under number 1, and the children are quick to tell someone when they are breaking it.

There have been days when I have sensed that the authoring cycle was too chaotic, the class was too noisy, that I was not seeing results fast enough, I could not figure out how to integrate math lessons and Johnny forgot to take his medication for hyperactivity and is creating

chaos instead of curriculum. When these interruptions in our day occur, I have to make new plans immediately. I change the structure of the day, add on a different activity, read aloud a special book, take a nature walk, experiment with movement and music, or another relevant distraction that might calm the class down. Through experience, teachers find out what works for their class. There is no patented solution to the problems we face daily in our classes. As teachers get to know the minds and hearts of their students, they work out solutions to those irritating problems that crop up once in a while.

I often stop and reflect on how much progress really has been made, within myself and in the way the children are learning. I record my ideas and daily happenings in my own reflective journal. This helps me to look back and learn from my mistakes, and reminds me of what worked really well.

For each of the components of the theme cycle, the children and I collaborate on how we will carry out our learning, what activities we will engage in, and the students work independently and cooperatively to achieve their goals. When we had finished with the section about our bodies, it was natural for us to learn about our families. This was not a specific science concept, but was easy to integrate, and was part of the History/Social Science Framework. Using a year-long theme has opened up a pathway to help integrate the curriculum. The focus of this

project has been on the integration of language arts and science, but in reality all the subject areas have been integrated at certain times. It has not been easy, but it has been rewarding. The administrator of my school has been supportive and willing to let me move slowly, take risks, and has helped me in the reflection process. I have received encouragement from some of my peers, and they have been sounding boards for me when I needed them. It is not like when I first began changing my beliefs about learning and few were interested in being helpful. There has been an atmosphere of change growing within my school, and I sense what I have been experiencing in my own class has helped bring it about. The students who have collaborated on this experiment have made and continue to make great strides in becoming independent learners and I have made giant leaps in my growth as an educator and a learner.

Evaluation choices...

"Evaluation should be a natural outcome of the process of creating meaning, used by the learners to improve performance and by teachers to gauge overall progress" (Harp, 1991, p. 26). Evaluation is an ongoing process in the classroom and a variety of strategies are employed.

The district in which I am employed mandates the use of portfolios for student evaluation. The portfolios list the competencies the children should master and contains samples of students' work through the year. This may include writing

samples, workbook pages, tests, interest inventories, anecdotal records and samples the children wish to include. I use the portfolios to help facilitate assessment, however I use a variety of other assessment tools including but not limited to:

1. Teacher observation:

Students choose how they want to present what has been learned. This may include oral presentations, written reports, Authors' folders (writing in progress and published writing), graphs, songs, music or other student generated meaning systems. I discuss and evaluate new learning with students by questioning whether they can related old information to new. "Kidwatching" allows me to assess if and how a student participates in shared or group activities and learning.

2. Conferences with students:

Conferences enable me to know my students as learners. I use the information to guide them in their learning. During conferences I make anecdotal observations of their growth and needs.

3. Journals and learning logs:

Journals are used by the students to record their thoughts, feelings, and needs. The reading of the journals helps me better understand each student and I apply that knowledge to the strategies I use in guiding

their learning. Learning logs are used to record data gathered through observation and experiments. They are used for assessing understanding of mathematics and science concepts and strategies used. Book logs or Reader Response logs are kept by the students in order for them to record, reflect and respond to literature they read.

4. Student Self evaluation:

Self evaluation helps children monitor their own progress. Children who are involved in their own self assessment tend to be more conscientious about their learning. Allowing children choices about how to present their learning has helped involve them in their own self evaluation process.

5. Report cards:

Report cards are a fact of life for most teachers. Report card grades are given in a fair and holistic manner. Grading is inconsistent with a whole language philosophy of process not product as the focus of learning, but in order to evaluate the processes learned, there is going to be some product generated. I use grades for looking at children in relation to where they began and for comparing and analyzing their growth over time. I do not use formal rubrics to evaluate students' growth, yet I have informal

checklists which the children and I use to evaluate their progress.

I evaluate the children with a belief that evaluation is first for the students so they understand and watch their own progress. Second it is for the teacher and third it is for the school district, parents and other teachers to show how a child is performing throughout the year (Harp, 1991).

Future goals...

As I look back and revel in how much has been accomplished all because I wanted to change, I have to stop and speculate on where I want to go from here. Of course the experiment is not complete. My students and I are in the process of creating a new strand about water and weather. After we explore these areas the children want to move to outer space. There are no boundaries to our learning. Regie Routman (1991, p. 501) wrote "Becoming a whole language teacher is no easy journey. There is no blue-print, recipe, or formula for success. There are few shortcuts and no ready solutions, and each teachers' route is slightly different." Becoming a whole language teacher is about learning and making major shifts in beliefs about teaching and learning.

My immediate goals are to continue to change and grow towards being the kind of teacher who makes a difference in children's lives. I want to be able to answer questions about my philosophical beliefs with confidence. I want to

take time for thoughtful reflection about my teaching, read professionally, observe other teachers and invite them to observe my class in order to share our knowledge. The path I have chosen is one of lifelong learning. I once believed I would quit taking classes and going to school when I achieved a master's degree. Now I toy with the idea of a doctorate so I can someday be part of the learning process of beginning teachers. I sense that if I had been taught to teach from a whole language philosophy, I would be farther along in my own growth process.

I can honestly say that I look forward to each day with my students. I anticipate what might happen and am constantly surprised and filled with awe at their knowledge, creativity, and learning capacity. I encourage all who are teachers now, who entered the teaching profession with excitement and energy and knew that this was where they were going to make a difference and now feel they are stuck in a boring, tedious, unrewarding job, to look at what is happening around them. Change is taking place. Teaching can once more be a joyful, exciting experience if they want it to be. Change takes time and it is well worth the fears, risks, tears, and uncertainty that I and many others like me have experienced.

In addition...

The following appendices have been added to this project not only to reflect what has been accomplished in

one classroom, but to be used by other teachers. I have found that having outlines of the Frameworks available to me is much easier than reading the State Frameworks each year. The annotated bibliographies could be helpful to other teachers when gathering resources for students to use for answering their many questions. Teachers are always looking for ideas and activities to tie in with what they are teaching and the list of resources are rich with these. The films, videos and computer programs are ones that I have personally seen, used and recommend for viewing and use.

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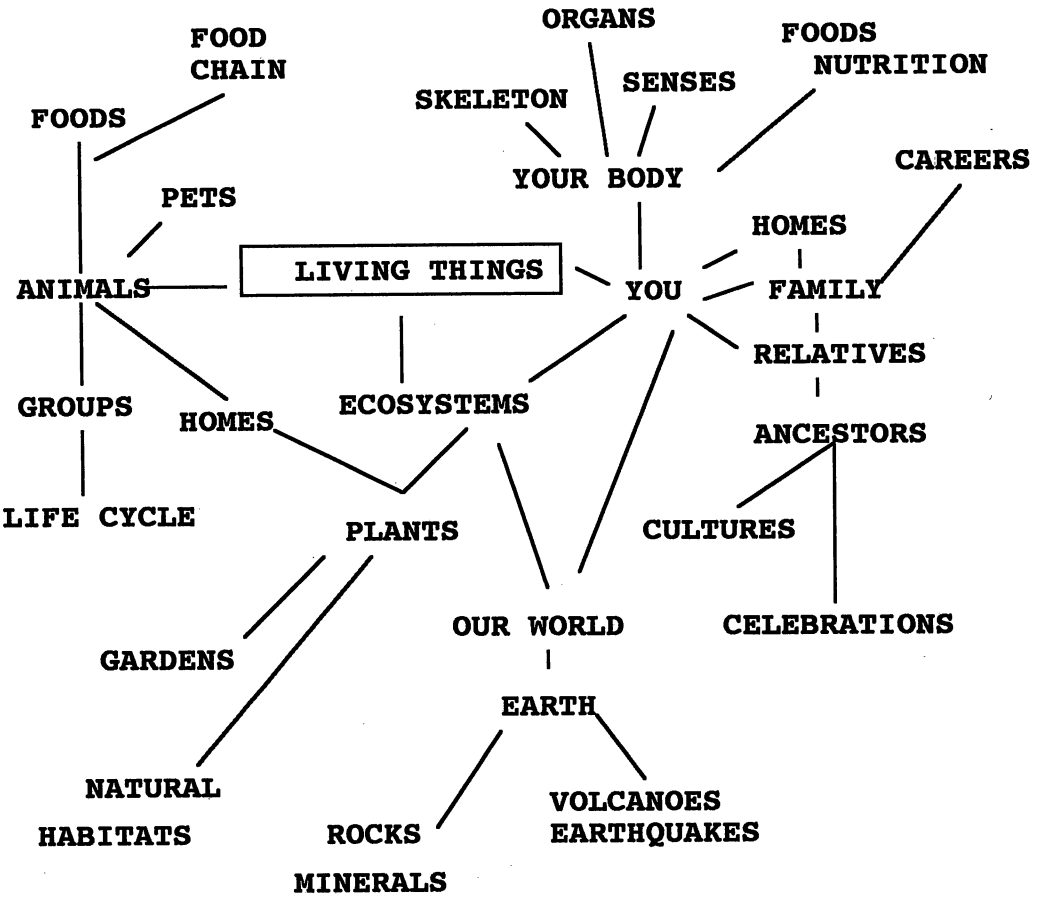
APPENDIX B

A GRAPHIC VIEW OF A YEAR-LONG THEME IN PROGRESS


FOOD CHAIN
FOODS
ORGANS
SKELETON
SENSES
FOODS
NUTRITION
YOUR BODY
CAREERS
PETS
HOMES
LIVING THINGS
ANIMALS
YOU
FAMILY
RELATIVES
GROUPS
HOMES
ECOSYSTEMS
ANCESTORS
LIFE CYCLE
PLANTS
CULTURES
OUR WORLD
CELEBRATIONS
GARDENS
EARTH
NATURAL HABITATS
ROCKS
MINERALS
VOLCANOES
EARTHQUAKES

APPENDIX C

ECOSYSTEMS

Ecosystems

I. What are ecosystems?

   A. Cycles: life, water, food

   B. Interdependency

II. How does energy flow through/within an ecosystem?

   A. Sun

   B. Food chains

III. How do ecosystems change?

   A. Life cycles

   B. Seasons

   C. Time

      1. Extinction and destruction

      2. Human intervention

IV. What are our responsibilities?

   A. Respect

   B. Interdependency

ANNOTATED BIBLIOGRAPHY
ECOSYSTEMS

Fiction

Baker, A. (1991). Two tiny mice. New York: Lothrop.

Two mice look on the world with a "mouse eye view". They see a variety of animals from their low place in the world. The illustrations are color paintings by the author that are so detailed you can see individual hairs on the animals.

Interest Level: Independent; primary.
Related Topics: Animals, interdependence, Ecosystems.
Illustrator: Baker, A.

Baker, J. (1987). Where the forest meets the sea. New York: Greenwillow.

Explore with a modern boy a tropical rainforest in Australia. The boy envisions what the forest might have looked like in the past and wonders if it will be here for him when he comes back to visit. The pictures of ghostly images of past life as well as the future raise questions about how humans value the land.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Rainforest Ecology, Ecosystems, Human Responsibility, Australia.
Illustrator: Baker J.

Baker, J. (1990). Window. New York: Greenwillow.

A wordless picture book which shows changes in our environment within the past 25 years. The book begins with a mother holding her baby and we see the growth of the boy through the changes that take place through the window.

Interest Level: All ages.
Related Topics: Changes, Environments, Ecosystems, Interdependence.
Illustrator: Baker, J.

Borden, L. (1991). The watching game. New York: Scholastic.

Four grandchildren play the watching game when they visit their grandparents house.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Animals, Environment, Observation.
Illustrator: Weidner, T.

Brown, R. (1991). The world that Jack built. New York: Dutton.

An introduction to the problems we face in our environment. The scene changes from an idyllic country scene to a grim ugly factory. The author uses a nursery rhyme rhythm to lull the reader into a false sense of security before letting the axe fall and the truth come out.

Interest Level: *Teacher* discretion for primary. Independent, intermediate.
Related Topics: Ecology, Ecosystems, Environment, Pollution, Human Responsibility.
Illustrator: Brown, R.

Cherry, L. (1990). The great kapok tree: A tale of the rain forest. New York: Gulliver.

A man with an axe sleeps in the Brazilian rainforest and is visited by animals that argue against chopping down a kapok tree. This story highlights the survival needs of a variety of animals, the interdependence of living things and the importance of conservation.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Ecosystems, Environment, Animals, Interdependence, Human Responsibility.
Illustrator: Cherry, L.

Cole, J. (1986). The magic school bus at the waterworks. New York: Scholastic.

Ms. Frizzle takes her class on an unusual field trip to explore the workings of the waterworks.

Interest Level: Read aloud, 2-3, Independent, intermediate.
Related Topics: Environment, Pollution.
Illustrator: Cole, J.

Cowcher, H. (1990). Antarctica. New York: Scholastic Inc.

A story of a penguin hatch reflects interaction among species in the far south. Emperor penguins, Weddell seals, Adelie penguins, Leopard seals and Skuas are shown in colorful illustrations. An environmental message shows how humans have intruded on other ecosystems.

Interest Level: Independent, all ages.
Related Topics: Environment, Ecosystems, Antarctica, Human responsibility, penguins.
Illustrator: Cowcher, H.

Craig, J. (1990). Rainforest secrets. Mahwah: Troll Associates.

Discusses the animals and plants which give such color and beauty to the tropical rainforests and jungles.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Ecosystems, Rainforest Ecology, Human Responsibility, Animals, Plants.
Illustrator: Schindler, S.D.

Fife, D.H. (1991). The empty lot. San Francisco, Ca: Sierra Club/Little Brown.

Harry Hale owns an empty lot and decides it would be better for him to sell it and get a little money for it, rather than let it stand empty. When he visits it to determine a price, he realizes the lot isn't empty after all. This book has a subtle message about looking at the world around you.

Interest Level: Read aloud, primary and intermediate.
Related Topics: Ecosystems, Environment, Observation.
Illustrator: Arnosky, J.

Jonas, A. (1991). Aardvarks, disembark! New York: Greenwillow.

Ann Jonas cleverly begins this story on the ark when the rains have stopped. Noah gives the order to disembark by calling out the names of the animals he knows in alphabetical order, but he is startled to find when he gets to Zebra many animals are still on the ark, 132 of them. The book ends with a list, definitions, and information about whether the animals are extinct or endangered.

Interest Level: Read aloud, all ages, independent, intermediate.
Related Topics: Animals, Extinction, Endangered species.
Illustrator: Jonas, A.

Miles, M. (1972). Wharf rat. San Francisco: Little/Brown.

A rat struggles to survive an oil spill.

Interest Level: Read aloud, all ages. Independent, intermediate.
Related Topics: Ecosystems, Pollution, Human Responsibility.
Illustrator: Miles, M.

Parnall, P. (1990). Woodpile. New York: Macmillan.

Peter Parnall explores the ecology of a woodpile. It is in his explorations of the spaces between and underneath the wood that the woodpile comes alive.

Interest Level: Read aloud, all ages. Independent, intermediate.
Related Topics: Ecosystems, Environment, Animals, Observation.
Illustrator: Parnall, P.

Peet, B. (1966). Farewell to Shady Glade. Boston: Houghten Mifflin Co.

The animals of Shady Glade discover monsters tearing up their homes. They decide to leave Shady Glade and go far away. They take the train and eventually find a spot just like Shady Glade.

Interest Level: All ages.
Related Topics: Ecosystems, Environment, Animals.
Illustrator: Peet, B.

Romanova, N. (1985). Once there was a tree. New York: Dial.

A Russian tale about a tree stump that attracts many living creatures who all believe the tree belongs to them. When the tree is gone, a new tree takes its place. The new tree attracts the same creatures. The book ends with saying the tree belongs to all who need it because it grows from Earth, home for all.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Ecosystems, Interdependence.
Illustrator: Romanova, N.

Seuss, Dr. (1984). The butter battle book. New York: Random House.

Engaged in a long-running battle, the Yooks and Zooks develop more and more sophisticated weaponry as they attempt to outdo each other.

Interest Level: Read aloud, all ages. Independent, intermediate.
Related Topics: Environment.
Illustrator: Seuss, Dr.

Seuss, Dr. (1971). The Lorax. New York: Random House.

A Once-ler chops down the truffula trees and uses their soft tufts to make thneeds. He must contend with the Lorax when his business not only destroys all the trees, but makes the environment unlivable for animals in the area.

Interest Level: All ages.
Related Topics: Environment.
Illustrator: Seuss, Dr.

Van Allsburg, C. (1990). Just a dream. Boston: Houghton Mifflin.

When he has a dream about a future Earth devastated by pollution, Walter begins to understand the importance of taking care of the environment.

Interest Level: Read aloud, all ages. Independent, intermediate.
Related Topics: Environment, Pollution, Dreams.
Illustrator: Van Allsburg, C.

Viorst, J. (1971). The tenth good thing about Barney. New York: Athenuem.

Barney the cat died. The boy thinks of nine good things about Barney to say at the funeral. Later, while planting seeds, the father helps his son decide that the tenth good thing about Barney is that he is in the ground and would help plants grow.

Interest Level: Primary.
Related Topics: Natural Habitats, Built Environments, Soil Conservation, Ecosystems.
Illustrator: Viorst, J.

Non-Fiction

Bash, B. (1990). Urban roosts: Where birds nest in the

city. San Francisco: Sierra Club/Little Brown.

Barbara Bash explores the urban roosts of an assortment of birds, including barn owls, snowy owls, and peregrine falcons. This book presents facts and follows with an explanation that often begins with "perhaps".

Interest Level: Intermediate.
Related Topics: Birds, Ecosystems, Built Environments.
Illustrator: Bash, B.

Baylor, B. (1975). The desert is theirs. New York: Macmillan.

The Papago Indians are desert people who know how to treat the desert and share its riches with the animal inhabitants.

Interest Level: Read aloud, primary. Independent. intermediate.
Related Topics: Ecosystems, Natural Habitats, Interdependence, Ecology, Conservation, Indians.
Illustrator: Baylor, B.

Dorros, A. (1990). Rainforest secrets. New York: Scholastic.

This book takes a close-up look at rainforests, home to more kinds of animals and plants than anywhere else on the earth. The author has visited rainforests in many parts of the world.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Ecosystems, Rainforests, Interdependence, Human Responsibility.
Illustrator: Dorros, A.

Elkington, J., Hailes, J., Hill, D. & Makower, J. (1990). Going green: A kid's handbook to saving the planet. New York: Viking.

This book begins with a simple explanation of how we got into the ecological mess we are in today and moves to a discussion of ways to determine the environmental impact of home, school, and community. It provides more than 20 pages of suggestions for good ecological practices; and ends with a "where to learn more" section.

Interest Level: Intermediate.
Related Topics: Ecology, Pollution, Human Responsibility.
Illustrator: Ross, T.

Hilton, P. & Viner, M. (1991). 365 ways for you and your children to save the Earth one day at a time. New York: Warner.

Different strategies for parents and their children to put into practice ecological thinking.

Interest Level: All ages.
Related Topics: Ecology, Human Responsibility.
Illustrator: N.A.

Jeffers, S. (1991). Brother eagle, sister sky. New York: Dial Books.

A Suquamish indian, Chief Seattle, describes his peoples' respect and love for the Earth, and concerns for its destruction.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Environment, Ecology, Interdependence, Native Americans.
Illustrator: Jeffers, S.

Lowery, L. (1991). Earth Day. Minneapolis: Carolrhoda.

Linda Lowery has written the history of Earth Day for primary readers. The text is simple and suitable for independent readers.

Interest Level: Primary.
Related Topics: Ecology, Human Responsibility.
Illustrator: Bergherr, M.

Norsgaard, E.J. (1990). Nature's great balancing act: In your own backyard. New York: Cobblehill/Dutton.

The author invites young readers into the back yard of their house in Connecticut, a yard which has been allowed to grow wild for several years. The inter-relationships among animals, plants, and people in this piece of the world will send children into their own backyards to discover what lives there.

Interest Level: All Ages.
Related Topics: Ecosystems, Interdependence, Observation.
Illustrator, Norsgaard, E.J

Potential Films and Videos

All Year 'Round Homes. (1989). 15 minutes, Journal.

Animals, Animals, Animals. (1972). (series), 22 minutes, Media Guild.

Let Them Live. (1982, 1987). (series), 22 minutes, Lucerne.

Life Habitat. (1990). (series), 14 minutes, MBG Videos.

Man and His Environment: Food From the Rainforest. (1971). 17 minutes, BFA.

Man and His Environment: Rainforest Family. (1971). 17 minutes, BFA.

The Lorax. (1972). 25 minutes, BFA.

Rainforest. (1983). 60 minutes, National Geographic.

Reading Rainbow Videos: G.P.N.

Bugs. (1988). 30 minutes

Chickens Aren't The Only Ones. (1986). 25 minutes.

Gift of The Sacred Dog. (1986). 28 minutes.

Humphrey the Lost Whale. (1988). 30 minutes.

Jack, The Seal and The Sea. (1990). 30 minutes.

Life Cycle of the Honey Bee (1986). 28 minutes.

Raccoons and Ripe Corn (1991). 30 minutes.

APPENDIX D

LIVING THINGS

Living Things

I. What are the characteristics of living things?
    A. Observable structures
    B. Needed resources
        1. Food, water, gasses to breathe

II. How do the structures of living things perform and interact with each other and their environments?
    A. Senses
    B. Nutrition

III. How are living things classified and what are their relationships?
    A. Classification
    B. Evolution

IV. How do we interact with other living things?
    A. Natural resources
    B. Healthy bodies

ANNOTATED BIBLIOGRAPHY
LIVING THINGS

Fiction

Carle, E. (1977). The grouchy ladybug. New York: Thomas Y. Crowell Company.

Boldly designed, bright colored pictures and easy-to-read text will delight young readers and listeners. The grouchy ladybug says neither please or thank you, it wouldn't share, and wanted to fight. It finally gets its come-uppance and becomes a much nicer, and better behaved bug.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Insects, Ladybugs, Animal Characteristics.
Illustrator: Carle, E.

Carle, E. (1984). The very busy spider. New York: Philomel Books.

The farm animals try to divert a busy little spider from spinning her web, but she persists and produces a thing of both beauty and usefulness. The pictures may be felt as well as seen.

Interest Level: Primary.
Related Topics: Spiders, Animal Characteristics.
Illustrator: Carle, E.

Carle, E. (1988). The very hungry caterpillar. New York: Scholastic.

A very hungry caterpillar eats his way through the story to turn into a beautiful butterfly at the end.*Interest Level:* Primary.
Related Topics: Insects, Caterpillars, Animal Characteristics.
Illustrator: Carle, E.

Climo, S. (1988). King of the birds. New York: Harper Trophy.

When chaos reigns among the birds, owl declares a contest to determine who will be their king. Beautiful color illustrations enhance the text.

Interest Level: Read aloud, primary. Independent.

intermediate.
Related Topics: Birds, Animal Characteristics.
Illustrator: Heller, R.

Cole, B. (1991). The smelly book. New York: Simon and Schuster, Inc.

Colorful pictures and Rhyming words create humorous visions of things that are very smelly.

Interest Level: All ages.
Related Topics: Senses, Smell, Human Body.
Illustrator: Cole, B.

Cole, J. (1989). The magic schoolbus inside the human body. New York: Scholastic Inc.

A special field trip on the magic school bus allows Ms. Frizzle's class to get a first-hand look at major parts of the body and how they work.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Human Body, Human Structure.
Illustrator: Degen, B.

Conklin, G. (1968). Lucky ladybugs. New York: Holiday House.

Fictional information book that tells facts and superstitions about the lucky ladybugs.

Interest Level: Primary.
Related Topics: Insects, Animal Characteristics.
Illustrator: Rounds, G.

Gelman, R.G. (1992). Body battles. New York: Scholastic.

This book introduces children to the natural defensive weapons in their super-sensational bodies in poetic read-aloud language.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Human Body, Immune System, Harmful Substances.
Illustrator: Freem, E.

Gibson, M. (1964). What is your favorite smell, my dear? New York: Grosset and Dunlap.

A book about the sense of smell. It combines pictures and text to enhance the topic of smell.

Interest Level: Primary.
Related Topics: Senses, Human Body, Smell.
Illustrator: Gibson, M.

Graham, M.B. (1967). Be nice to spiders. New York: Harper and Row.

Helen the spider moves into the zoo and saves the animals from the bothersome flies. The zoo-keeper wants to clean up the zoo and get rid of the webs, but Helen proves to be a good friend.

Interest Level: Primary.
Related Topics: Spiders, Animal Characteristics.
Illustrator: Graham, M.B.

Hornblow. A. & Hornblow, L. (1964). Animals do the strangest things. New York: Random House.

Cartoon-like illustrations enhance the text which tells about nineteen different animals and their unusual characteristics.

Interest Level: All ages.
Related Topics: Animal Characteristics.
Illustrator: Frith, M.K.

Howe, J. (1990). I wish I were a butterfly. San Diego: Gulliver Books.

A little cricket struggles with a mighty problem. Forced to question his identity, he seeks council and reassurance from a very special spider.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Insects, Crickets, Spiders, Animal Characteristics.
Illustrator: Young, E.

Johnston, T. (1987). Whale song. New York: G.P. Putnam's Sons.

Counting as they sing, whales use their mighty voices to pass on to one another the numbers from one to ten.

Interest Level: Primary.
Related Topics: Whales, Counting, Animal characteristics.
Illustrator: Young, E.

King, D. (1990). Cloudy. New York: Philomel Books.

This story follows the quiet activities of a cat as it blends into its surroundings.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Cats, Animal Characteristics.
Illustrator: King, D.

Lester, H. (1988). Tacky the penguin. Boston: Houghton Mifflen Co.

Tacky the penguin does not fit in with his sleek and graceful companions, but his odd behavior comes in handy when hunters come with maps and traps.

Interest Level: Primary.
Related Topics: Penguins, Birds, Animal Characteristics.
Illustrator: Munsinger, L.

Litchfield, A.B. (1976). Button in her ear. Chicago: Albert Whitman and Co.

A little girl relates how her hearing deficiency is detected and corrected with the use of a hearing aid.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Senses, Hearing, Human Body.
Illustrator: Mill, E.

Maxner, J. (1991). Nicholas cricket. New York: Scholastic.

An amusing poetic book describing the music crickets make.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Crickets, Animal Characteristics.
Illustrator: Joyce, W.

Melville, H. (1991). Catskill eagle. New York: Philomel Books.

Melville's classic story of an eagle who dwells in the Catskill Mountains. Beautiful paintings and big print makes this an enjoyable read for primary children.

Interest Level: All ages.

Related Topics: Eagles, Animal Characteristics, Environment.
Illustrator: Thomas, L.

Myrick, M. (1968). Ants are fun. New York: Harper and Row.

A new boy moves into the neighborhood and he has an ant farm. Another boy has a horny toad. The new boy teaches his new friends how to build an ant community.

Interest Level: Primary.
Related Topics: Ants, Built Environments, Insects, Animal Characteristics.
Illustrator: Lobel, A.

Nash, O. (1986). Zoo. New York: Stewert, Tabori & Chang.

A collection of Ogden Nash's poems about animals.

Interest Level: Read aloud, primary. All Ages.
Related Topics: Animals, Poetry
Illustrator: Delessert, E.

Selsam, M. (1963). Greg's microscope. New York: Harper & Row.

Greg wants a microscope more than anything so he can see tiny things. When he gets one, he finds interesting things to look at without leaving the house. His family becomes so interested that Greg thinks everyone in the house needs a microscope.

Interest Level: Primary and intermediate.
Related Topics: Microscopes.
Illustrator: Lobel, A.

Selsam, M. (1966). How to be a nature detective. New York: Harper and Row.

This book describes how you can be a detective, a nature detective, types of clues to look for, and how to gather information from the clues.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Animals, Animal Tracks, Animal Characteristics
Illustrator: Keats, E.J.

Tresselt, A. (1957). The rabbit story. New York: Lothrop, Lee and Shepard Co., Inc.

A story about a rabbit family, how the rabbits grow and what they eat. This story is a fiction informational book which tells facts while telling a story.

Interest Level: Primary.
Related Topics: Rabbits, Mammals, Animal Characteristics.
Illustrator: Weisgard, L.

Van Allsburg, C. (1988). Two bad ants. Boston: Houghten Mifflin.

When two bad ants desert from their colony, they experience a dangerous adventure that convinces them to return to their former safety.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Ants, Insects, Animal Characteristics.
Illustrator: Van Allsburg, C.

Zahradka, M. (1971). The un-terrible tiger. New York: Scroll Press.

Among the terrible tigers in a dark jungle, there is an un-terrible tiger. He hates all the terrible things and is not popular with the other tigers. He eventually finds happiness and is loved by children.

Interest Level: Primary.
Related Topics: Tigers, Mammals, Animal Characteristics.
Illustrator: Zahradka, M.

Non-Fiction

Baker, L. (1992). Life in the oceans. New York: Scholastic Inc.

Photographs and illustrations offer an exciting introduction to all forms of ocean life. This book includes a discussion of how we can help preserve our oceans and a traditional folk-tale from Fiji.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Fish, Mammals, Plant Life, Interdependency, Human Responsibility.
Illustrator: Baker, L.

Balestrino, P. (1971). The skeleton inside you. New York: Thomas Y. Crowell Company.

An easy-to-read book that explains how the 206 bones of the skeleton are joined together, how they grow, how they help make blood, what happens when they break and how they mend.

Interest Level: Read aloud and independent, primary.
Related Topics: Human Body, Human Structure, Skeleton, Bones.
Illustrator: Bolognese, D.

Berger, G. (1989). The human body. New York: Doubleday.

An exploration of the parts and functions of the human body which includes the basic systems.

Interest Level: Primary and intermediate.
Related Topics: Human Body, Human Functions,
Illustrator: May. D.

California State Series. (1967). Western Butterflies. Sacramento: California Department of Education.

Beautifully illustrated with lithographs of butterflies found between the Rocky Mountains and Pacific ocean. Facts and interesting information about these butterflies.

Interest Level: Intermediate.
Related Topics: Butterflies, Insects, Animal Characteristics.
Illustrator: N.A.

Charlip R., Ancona, M., & Ancona, G. (1974). Hand talk: An ABC of finger spelling and sign language. New York: Parent's Magazine Press.

Photographs show how to make the alphabet in sign language.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Senses, Sign Language, Disabilities.
Illustrator: Ancona, G., photographer.

Drew, D. (1990). Animal acrobats. Australia: Maurbern, Pty Ltd.

This big book uses high speed photographs to capture animals doing things that are too fast for our eyes.

Interest Level: All ages.
Related Topics: Animals, Animal Characteristics.

Illustrator: Drew, D.

Drew, D. (1990). Skeletons. Australia: Maurbern Pty Ltd.

Children will love to guess the riddles in this big book. Photographs of animal skeletons and clues lead readers to guess what kind of animals they are. Answers are on flaps on the opposite pages.

Interest Level: Read aloud, primary. Independent, intermediate, All ages.
Related Topics: Body Structure, Animals.
Illustrator: Drew, D.

Eyewitness Books: Mammal. (1989). New York: Alfred A. Knopf.

Photographs and text examines the world of mammals, depicting their development, feeding habits, courtship rituals, protective behavior, and physical adaptation to their various ways of life.

Interest Level: Intermediate.
Related Topics: Mammals, Animal Structure, Animal Characteristics.
Illustrator: N.A.

Eyewitness visual dictionaries: The visual dictionary of animals. (1992). New York: Dorling Kindersley Inc.

A visual dictionary about animals which includes photographs and illustrations which represent all the animal classes.

Interest Level: All ages.
Related Topics: Animals, Animal Characteristics.
Illustrator: N.A.

Farb, P. & The Editors of LIFE. (1967). The insects. Sacramento: California State Department of Education.

A picture essay book which covers the insect family.

Interest Level: All ages.
Related Topics: Insects, Animal Characteristics.
Illustrator: N.A.

Frevert, P.D. (1983). Patrick, yes you can. New York: Creative Ed., Inc.

Patrick was born with glaucoma and lost his vision in his right eye. A later accident left him totally blind in

second grade. His story tells of his courage to face this hardship.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Senses, Human Structure, Courage, Sight.
Illustrator: Di Martine, S., photographer.

Johnson, S.A. (1976). Downey the duckling. Minneapolis: Carolrhoda Books, Inc.

This book illustrates a duckling's birth and first month of life using text and photographs followed by general information about ducks.

Interest Level: Primary.
Related Topics: Ducks, Birds, Baby Animals, Animal Characteristics.
Illustrator: Hatier, L.A. photographer.

Jones, G. (1982). Know it all library: Cats. New York: Nutmeg Press.

This book examines the history, habits and characteristics of a variety of breeds of cats.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Cats, Mammals, Animal Characteristics.
Illustrator: Jones, G.

Masui, M. (1989). Pandas of the world. Tokyo: Kin no Hoshisha.

This book contains color photographs of pandas which live in zoos around the world. It gives facts about pandas and tell about their personal lives.

Interest Level: All ages.
Related Topics: Pandas, Animals, Animal Characteristics.
Illustrator: Zoological Society of Tokyo and Masui, M., Photographers.

May, J. (1972). Cascade cougar. Mankato: Creative Educational Society, Inc.

This book describes the life of a mother cougar with kittens, how and what they eat, and their enemies. Watch the young cougars grow up and start the life cycle again.

Interest Levels: Read aloud, primary. Independent, intermediate.

Related Topics: Mammals, Animal Characteristics, Life Cycles.
Illustrator: Ruth, R.

McCauley, J.R. (1986). Animals that live in trees. Washington D.C.: National Geographic Society.

Describes and illustrates different kinds of animals that build their homes in trees.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Animal Homes, Animal Characteristics.
Illustrator: N.A.

Meadows, G. (1991). Animal friends. Aukland: Shortland Publications.

A big print book describing animal friends, caring for pets and animal usefulness.

Interest Level: Primary and intermediate.
Related Topics: Animals, Animal Characteristics.
Illustrator: Seip, C., photographer.

Meadows, G. (1991). Animal sanctuaries. Aukland: Shortland Publications.

Beautiful color photographs enhance this book about animal sanctuaries. Children can read about the animal world, helping animals and types of animal sanctuaries.

Interest Levels: Primary and intermediate.
Related Topics: Animals, Human Responsibility.
Illustrator: N.A.

Meadows, G. (1991). Extinction is forever. Aukland: Shortland Publications.

A big book full of color photographs and easy-to-read text that explains extinction, how people cause it and conservation strategies.

Interest Level: Primary and intermediate.
Related Topics: Animals, Extinction, Conservation, Human Responsibility.
Illustrator: Department of Conservation, New Zealand

Meadows, G. (1987). Zoos past and present. Aukland: Shortland Publications.

This big book tells how zoos started, why they exist and what they might be like in the future.

Interest Level: All ages.
Related Topics: Animals, Zoos, Animal Homes, Human Responsibility.
Illustrator: Williamson, F.

Miller, L. (1965). Sound. New York: Coward-McCann Inc.

By using everyday happenings, Lisa Miller introduces children to a complicated but fascinating scientific concept- sound.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Senses, Sound, Hearing, Human Structure.
Illustrations: De Paola, T.

Orii, E., & Orii, M. (1989). Simple science experiments with optical illusions. Wisconsin: Gareth Stevens Children's Books.

Presents various optical illusions for the reader to perform which illustrate how visual perception can be distorted.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Sight, Optical Illusions, Human Structure.
Illustrator: Fujishimi, K.

Parsons, A. (1990). Eyewitness juniors: Amazing Mammals. New York: Alfred A. Knopf, Inc.

Text and photographs introduce such notable mammals as the elephant, sloth, koala and porcupine. It explains what makes them unique and describes the important characteristics of the entire group.

Interest Level: All ages.
Related Topics: Mammals, Animal Characteristics.
Illustrator: Young, J., photographer.

Phillips, G. (1991). First facts about snakes and other reptiles. Chicago: Kidsbooks, Inc.

An easy-to-read book with beautiful illustrations combine to make learning about reptiles an enjoyable experience.

Interest Level: Primary and Intermediate.

Related Topics: Snakes, Reptiles, Animal Characteristics.
Illustrator: Persico, F.S.

Podendorf, I. (1971). Shadows and more shadows. Chicago: Children's Press.

This book emphasizes the processes of science and observing and inferring skills are defined and the differences pointed out clearly.

Interest Level: Primary and intermediate.
Related Topics: Sight, Senses, Illusions, Shadows.
Illustrator: Wiskur, D.

Rankin, L. (1991). The handmade alphabet. New York: Dial Books.

Presents the manual alphabet in American Sign Language. Beautiful illustrations.

Interest Level: All ages.
Related Topics: Sign Language, Human Structure, Senses.
Illustrator: Rankin, L.

Sandie S. (1992). Eyewitness juniors: Amazing animal disguises. New York: Alfred A. Knopf.

Introduces animal disguises involving camouflage and mimicry in such animals as the zebra, polar bear and caterpillar.

Interest Level: All ages.
Related Topics: Animal Characteristics, Animal Camouflage.
Illustrator: N.A.

Schneck, P.D. (1982). Why do we have skeletons? Mankato: Creative Education, Inc.

An easy-to-read book about the human skeleton. It answers questions that children ask.

Interest Level: Primary.
Related Topics: Human Body, Human Structure, Skeleton, Bones.
Illustrator: Higashi, S.

Schnieper, C. (1986). On the trail of the fox. Minneapolis: Carolrhoda Books.

This book describes the habits of the Red fox, including its birth, mating, raising of young, hunting, fighting and playing.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Foxes, Mammals, Animal Characteristics.
Illustrator: Labhardt, F.

Simon, S. (1980). Mirror magic. New York: Lothrop, Lee and Shepard Books.

This book gives detailed science experiments that deal with mirrors and optical illusions. These experiments are easy enough for primary grades, but will challenge intermediate grades.

Interest Levels: Primary and intermediate.
Related Topics: Sight, Optical Illusions, Senses, Human Structure.
Illustrator: Ernst, L.

Sproule, A. (1987). Body watch: Know your insides. New York: BLA Publishing Limited.

The author discusses the human skeleton, body cells and tissue, skin, hair and the idea of a balanced diet in straight forward language.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Human Body, Human Structure, Nutrition.
Illustrator: N.A.

Stevens, C. (1963). Catch a cricket. New York: Young Scott Books.

This story tells about the capture and care of crickets, grasshoppers, fireflies and other companionable creatures.

Interest Levels: Read aloud, primary. Independent, intermediate.
Related Topics: Insects, Animal Habitats, Animal Characteristics.
Illustrator: Iger, M.

Potential Films and Videos

Amphibians. (1977). 16 minutes, International Films.

Animal Families. (1986). 11 minutes, Barr Films.

Fish Story. (1986). 14 minutes, Stanton.

Human Senses. (1990). (series), 15 minutes, National Geographic.

Insects Are Interesting. (1953). 11 minutes, IFB.

Insects: Cycles of Life. (1987). 20 minutes, Barr Films.

Mammals. (1978). 10 minutes, AIMS

Reptiles Are Interesting. (1955). 10 minutes, FA.

Skeleton: Our Fantastic Framework. (1988). 13 minutes, Stanton.

Wonder Why? Senses. (1991). 25 minutes, Lucerne.

Your Body and Its Parts. (1964). 12 minutes, EBEC.

You and Your Eyes. (1958). 8 minutes, Disney.

You and Your Ears. (1988). 14 minutes, Disney.

Reading Rainbow Videos: GPN.

Arthur's Eyes. (1986). 28 minutes.

Dive To The Coral Reef. (1990). 30 minutes.

Germs Make Me Sick. (1986). 28 minutes.

Gregory The Terrible Eater. (1986). 29 minutes.

APPENDIX E

OUR WORLD

Our World

I. How has platetectonics shaped the earth?

A. Earth's changes

1. Volcanos, earthquakes

II. How are rocks and minerals:

A. Formed

B. Distinguished

C. Classified

III. What is the history of the earth?

A. Changes

1. Evolution

B. Formations

1. Valleys, mountains, plains, deserts, rivers

IV. What are our responsibilities toward natural resources?

A. Conservation and recycling

ANNOTATED BIBLIOGRAPHY
OUR WORLD

Fiction

Cole, J. (1987). The magic schoolbus inside the earth. New York: Scholastic.

On a special field trip in the magic schoolbus, Ms. Frizzle's class learns first hand about different kinds of rocks and the formation of the earth.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Earth Science, Earthquakes, Rock Formations.
Illustrator: Degen, B.

Lewis, T. P. (1971). Hill of Fire. New York: Harper Trophy.

A farmer who lives in Mexico complains that nothing ever happens in his village. One day while plowing in his field, white smoke comes from a hole in the ground. The earth cracks and a fiery mountain is born. The village is destroyed. The name the people gave the great volcano is El Monstruo.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Earth Science, Volcanos, Mexico, Fiction informational.
Illustrator: Sandin, J.

McNulty, F. (1979). How to dig a hole to the other side of the world. New York: Harper and Row.

A young boy goes on an adventure of a lifetime by digging a hole through to the other side of the world.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Earth Science, Under the Earth.
Illustrator: McNulty, F.

Steig, W. (1969). Sylvester and the magic pebble. New York: The Trumpet Club.

Sylvester finds a magic pebble and makes wishes on it. He accidently wishes the wrong wish and finds himself a rock.

Interest Level: Primary.
Related Topics: Rocks, Magic, Wishing.
Illustrator: Steig, W.

Non-Fiction

Ames, G. & Wyler, R. (1957). The Earth's story. New York: Creative Educational Society.

The pictures and text in this book illustrates the major features of our Earth as we see them today.

Interest Level: High primary, Intermediate.
Related Topics: Natural Wonders, Earth Science, Rock Formations.
Illustrator: Ames, G. & Wyler, R.

Branley, F.M. (1990). Earthquakes. New York: Thomas Y. Crowell.

Discusses why earthquakes happen, what their sometimes devastating effects can be, where the danger zones are and what measures people can take to safeguard themselves.

Interest Level: Primary and intermediate.
Related Topics: Earthquakes, Platetectonics, Earth Science.
Illustrator: Rosenblum, R.

Beiser, A. & The Editors of LIFE. (1963). The Earth. New York: TIME Inc.

A TIME-LIFE book which explains in detail with illustrations and photographs the Earth and its processes.

Interest Level: Photographs, all ages. Independent, intermediate and up.
Related Topics: Earth Science, Natural Wonders, Earth's Processes.
Illustrator: TIME-LIFE.

Bendick, J. (1966). The shape of the Earth. New York: Rand McNally and Co.

Describes a theory of how the earth began and takes the reader exploring the wonders of the Earth.

Interest Level: High primary, Intermediate.

Related Topics: Earth Science, Earth's Formation, Volcanos, Earthquakes.
Illustrator: Bendick, J.

Darling, Dr. (1990). Could you ever? Dig a hole to China. Minneapolis: Dillon Press Inc.

Describes what the Earth is made of, how it formed and why it is still constantly changing its crust. Explores caves, tunnels and deep holes to learn more about the planet layers.

Interest Level: Primary and intermediate.
Related Topics: Earth Science, Earth's Processes, Caves.
Illustrator: N.A.

Galent, R.A. (1960). Exploring under the Earth. New York: Garden City Books.

Describes the Earth, what is underneath, rocks, volcanoes, the Earth as a magnet and facts about the Earth.

Interest Level: Read aloud, primary. Independent, intermediate.
Related Topics: Earth Science, Rocks and Minerals, Volcanoes.
Illustrator: Polgreen, J.

Gilbert M. (1961). Starting a rock and mineral collection. New Jersey: C.S. Hammond and Co. Inc.

A detailed book which describes a variety of rocks and minerals, where to find them and how to classify them.

Interest Level: High primary. Intermediate.
Related Topics: Rocks and Minerals, Rock Collecting, Earth Science.
Illustrator: Ferguson, W., et al.

Larson, N.D. (1982). Why do we have earthquakes? Mankato: Creative Education, Inc.

Easy-to-read text explains why we have earthquakes and details about platetectonics.

Interest Level: Primary and intermediate.
Related Topics: Earthquakes, Platetectonics, Earth Science.
Illustrator: Higashi, S.

Lauber, P. (1965). Volcanoes. Champaign: Garrard Publishing Co.

This book describes volcanoes, how they were born, what causes volcanoes and volcanoes and man.

Interest Level: Primary and intermediate.
Related Topics: Volcanoes, Earth Science.
Illustrator: Kalmenoff, M.

May, J. (1969). Why the Earth quakes. New York: Holiday House.

Facts about earthquakes, why and how they happen. Describes particular earthquakes which the Earth has experienced.

Interest Level: High primary and intermediate.
Related Topics: Earth Science, Earthquakes.
Illustrator: Fisher, L.E.

McKinnon, J. (1991). Under the ground. Aukland: Shortland Publications.

Color pictures and easy-to-read text explore what is under our Earth. Discusses caves, life underground, under our cities and rocks and minerals.

Interest Level: Primary and intermediate.
Related Topics: Earth Science, Caves, Life Underground, Rocks and Minerals.
Illustrator: Tripp, T. & Williamson, F.

O'neill, C. (1984). Natural wonders of North America. Washington D.C.: National Geographic Society.

Color Photographs of natural wonders all over the world invite children of all ages to explore the world they live in.

Interest Level: All ages.
Related Topics: Earth Science, Natural Wonders.
Illustrator: National Geographic Society.

Podendorf, I. (1958). The true book of rocks and minerals. New York: Children's Press.

A big print easy-to-read book about rocks and minerals, how they are formed and their importance.

Interest Level: Primary.
Related Topics: Rocks and Minerals, Earth Science.
Illustrator: Podendorf, I.

Porter, Dr. S.C., Skinner, Dr. B.J. & Hartmann, Dr. D.L. (1990). The miracle planet. New York: W.H. Smith Publishers, Inc.

Based on the television series, "The Miracle Planet", this book abounds in color photographs of our planet.

Interest Level: All ages.
Related Topics: Natural Wonders, Earth Science.
Illustrator: 1990 Japan Broadcasting Corporation and Japan Broadcast Publishing Co. Ltd.

Sevrey, I.O. (1958). The first book of the Earth. New York: Franklin Watts, Inc.

Theorizes how the Earth began, what it is made of, and describes some of the Earth's wonders.

Interest Level: Intermediate.
Related Topics: Earth Science, Earth's Beginning.
Illustrator: Waltrip, M.

Sutton, F. (1960). Our Earth. New York: Grosset & Dunlap.

This book is a guide to learning more about the Earth. It deals with a variety of topics and answers questions about the Earth.

Interest Level: Primary and intermediate.
Related Topics: Earth Science, Volcanoes, Earthquakes.
Illustrator: Hull, J.

Symes, Dr. R.F. & The Staff of the Natural History Museum, London. (1991). Eyewittness books: Rocks and minerals. New York: Alfred A. Knopf.

Text and photographs examine the creation, importance, erosion, mining and uses of rocks and minerals.

Interest Level: All ages.
Related Topics: Rocks, Mineralogy, Earth Science.
Illustrator: N.A.

Updegraff, R., & Updegraff, I. (1981). Earthquakes and volcanoes. Mankato: The Children's Book Co.

Discusses the Earth's crust, faults, earthquakes, tidal waves, volcanoes, geysers and gives activities to do to simulate these phenomenon.

Interest Level: All ages.

Related Topics: Earth's Wonders, Earth Science.
Illustrator: Updegraff, R. & Updegraff, I.

Wyler, R. & Ames, G. (1970). Secrets in stones. New York: Scholastic.

An easy-to-read book that tells where stones come form, what they are made of, about crystals, and hunting for fossils. There is an index in the back to help children find the information they are looking for.

Interest Level: High primary, Intermediate.
Related Topics: Earth Science, Rocks and Minerals Geology, Mineralogy.
Illustrator: Ames, G. Photographer.

Zim, H. & Shaffer, P.R. (1990). Rocks and minerals. New York: Golden Press.

A guide to aid in identifying rocks and minerals. Discusses the importance and uses of rocks and minerals.

Interest Level: All ages.
Related Topics: Rocks and Minerals, Mineralogy, Earth Science.
Illustrator: Zim, H.

Potential Films and videos

Fossils Are Interesting. (1956). 10 minutes, FA.

Fossils, Fossils. (1989). 18 minutes, Barr Films.

Geology: A First Film. (1975). 10 minutes, BFA.

Primary Science: Earth. (1990). 10 minutes, Barr Films.

River: A First Film. (1986). 11 minutes, BFA.

Rocks, Minerals and Fossils. (1985). 17 minutes, Barr Films.

Wonder World of Science. (1987). (series). 11 minutes, Coronet.

Reading Rainbow Videos: GPN.

Hill of Fire. (1986). 28 minutes.

The Magic School Bus Inside The Earth. (1990). 30 minutes.

APPENDIX F

OUTLINES OF THE STATE FRAMEWORKS

When integrating the curriculum, there needs to be some understanding of what the State considers correct curriculum for each grade. The following outlines have been extrapolated from the History/Social Science, English-Language Arts and the Mathematics Framework for California Public Schools. Developing these outlines has helped me to focus on what my students are interested in, and what they should be exposed to. For the Visual and Performing Arts Framework, I have recorded the premises the Framework is based on. For any teacher to really consider integrating visual and performing arts, I suggest reading the Framework to gain better understanding of what it encompasses.

<u>English/Language Arts Framework</u> (1987)

Program for kindergarten through grade three.

I. Understanding of meaning as the main focus:

II. Hear and read good literature:

- A. Develop an ear for written language
- B. Enlarge students' vocabulary
- C. Develop a common background of content
- D. Build a love of reading

III. Provide opportunities for expression:

- A. Speak confidently
- B. Listen respectfully

IV. Language arts is integrated, purposeful and constructive:

A. Read good books

B. Instruction in phonics

C. Use of common words from the environment

V. Writing:

A. The writing process

1. Pre-writing

2. Drafting

3. Revising

4. Editing

B. Subskills taught to meet the individual needs

1. Handwriting

2. Grammar

3. Spelling

4. Punctuation

History-Social Science Framework (1987)

Program for grade two.

I. People who make a difference:

A. People who supply our needs

1. Farmers

2. Dairy workers

3. Processors and distributors

4. Interdependency

B. Our parents, grandparents and ancestors from long ago

1. Family history/heritage

2. Homes

3. Experiences

C. People from many cultures, now and long ago

1. Famous people

2. Local heros

3. Contributions to our lives

4. Cultural diversity

Mathematics Framework (1992)

Kindergarten through grade four.

I. Mathematics as Problem Solving:

A. Investigate and understand mathematical content

B. Formulate problems from everyday situations

C. Develop and apply strategies to solve problems

D. Verify and interpret results

E. Acquire confidence in using math meaningfully

II. Mathematics as Communication:

A. Relate physical materials, pictures and diagrams to mathematical ideas

B. Reflect and clarify thinking about math ideas and situations

C. Relate everyday language to math language and symbols

D. Listening, speaking, reading and writing are a vital part of learning and using mathematics

III. Mathematics as Reasoning:

A. Draw logical conclusions

B. Use models, known facts properties, and relationships to explain thinking

C. Justify answers and solution processes

D. Use patterns and relationships to analyze math situations

E. Believe that math makes sense

IV. Mathematical Connections:

A. Link conceptual and procedural knowledge

B. Relate concepts or procedures to one another

C. Recognize relationships among different math topics

D. Use math in other curricular areas

E. Use math in daily lives

V. Estimation:

A. Explore estimation strategies

B. Recognize when an estimate is appropriate

C. Determine the reasonableness of results

D. Apply estimation to quantities, measurement, computation, and problem solving

VI. Number Sense and Numeration:

A. Construct number meanings through real-world experiences

B. Understand the numeration system

1. Counting, grouping and place value

C. Develop number sense

D. Interpret multiple uses of numbers in the real world

VII. Concepts of Whole Number Operations:

A. Develop meaning for the operations

B. Relate math language and symbolism to problems and informal language

C. Recognize the interdependency problem structures

D. Develop operation sense

VIII. Whole Number Computation:

A. Model, explain and develop proficiency with basic facts and algorithms

B. Use mental computation and estimation techniques

C. Use calculators

D. Use computation and determine if results are reasonable

IX. Geometry and Spatial Sense:

A. Describe, model draw and classify shapes

B. Combining, subdividing and changing shapes

C. Develop spatial sense

D. Relate geometric ideas to number and measurement

E. Recognize geometry in the world

X. Measurement:

A. Attributes of measurement

1. Length, capacity, weight, area, volume, time, temperature and angle

B. Process of measuring and concepts related to units of measurement

C. Make and use estimates of measurement

D. Make and use measurements in problem and everyday situations

XI. Statistics and Probability:

A. Collect, organize, and describe data

B. Construct, read, and interpret displays of data

C. Formulate and solve problems

D. Explore concepts of chance

XII. Fractions and Decimals:

A. Concepts of fractions mixed numbers and decimals

B. Number sense for fractions and decimals

C. Use models to relate fractions to decimals and find equivalent fractions

D. Use models to explore operations on fractions and decimals

E. Apply fractions and decimals to problem situations

XIII. Patterns and Relationships:

A. Recognize, describe, extend and create patterns

B. Represent and describe mathematical relationships

C. Explore variables and open sentences to express relationships

Visual and Performing Arts Framework (1989)

Framework Premises:

I. Reflects an awareness of trends in education and society:

II. Provides direction for restoring balance in the curriculum:

III. Focuses on developing important avenues of perception:

A. visual, aural, tactile, kinesthetic

IV. Fundamental relationships exist among dance, drama/theatre, music and the visual arts and other areas of the curriculum:

**The arts are important in the education of all students to provide for balanced learning and to develop the full potential of their minds.

**The arts provide the sensory and perceptual input essential to the development of nonverbal and verbal communication.

**The arts can be used to vitalize and clarify concepts and skills in all curriculum areas.

**The arts can be a vital part of special education.

**The arts in general education provide an avenue for the identification of gifted and talented students whose special abilities may otherwise go unrecognized.

**The arts provide avenues for accomplishment, media for non-verbal expression and opportunities for verbally limited bilingual students to learn the English language.

**The arts provide unique ways of knowing oneself and the world.

**Learning the language and structure of the arts enables the individual to deepen levels of participation as an artist, performer, and/or responder.

**Images, sounds movement, and words are unique ways of presenting the ideas, feelings, hopes, desires, aspirations, and fantasies that are manifested through the arts.

**The arts expand possibilities for imaginative thinking by developing and drawing on an individual's bank of images, sounds, and movement.

APPENDIX G

POTENTIAL

RESOURCES

AIMS Education Foundation. (various topics). Contact: AIMS Education Foundation, P.O. Box 7766 Fresno, CA 93747.

California State Department of Education. (1987). English language arts framework for California public schools kindergarten through grade twelve. Sacramento: Office of State Printing.

California State Department of Education. (1988). History/ social science framework for California public schools kindergarten through grade twelve. Sacramento: Office of State Printing.

California State Department of Education. (1992). Mathematics framework for California public schools kindergarten through grade twelve. Sacramento: Office of State Printing.

California State Department of Education. (1990). Science framework for California public schools kindergarten through grade twelve. Sacramento: Office of State Printing.

California State Department of Education. (1989). Visual and performing arts framework for California public schools kindergarten through grade twelve. Sacramento: Office of State Printing.

Cornell, J. (1978). Sharing nature with children. Nevada City, CA: Ananda Publications.

Hands-on Nature. Lingelbach, Jenepher (ed.). (1996). Woodstock, VT. Vermont Institute of Natural Sciences.

Playmaking: An Integration of the Arts in Education. (1991). Contact: CES, P.O. Box 4635, Riverside, CA 92514-4635.

Project Learning Tree. For K-12 grades, inservice requirement. Contact: Project Learning Tree Coordinator, California Department of Forestry, P.O. Box 944246, Sacramento, CA 94244-2460.

Project Wild and Wild Aquatic. For K-12 grades, inservice requirement. Contact: Project Wild coordinator, California Department of Fish and Game, P.O. Box 944209, Sacramento, CA 94224-2090.

Ranger Rick's Nature Scope (various topics). Washington D.C.: National Wildlife Federation, 1980.

Science Through Children's Literature: An Integrated Approach. Contact: TEACHER IDEAS PRESS, P.O. Box 3988 Inglewood, Colorado 80155-3988.

The California Environmental Education Guide, for K-6 grades. Contact: Alameda County Office of Education Media Sales, 313 West Winton Ave., Hayward, CA 94544-1198.

Think Earth, Environmental Education Program. Contact: Think Earth Distribution Office. 5505 East Carson Street, Suite 250 Lakewood, CA 90713.

The Green Box, for K-8 grades. Contact: Humbolt County Office of Education, Environmental Education, 901 Myrtle Ave., Eureka, CA 95501.

Watson, D.J. (Ed.). (1987). Ideas and insights: Language arts in the elementary school. Urbana: National Council of Teachers of English.

Technological Resources

Andrews, P., & Shaver, R. (1989). Learn about animals [Computer program]. Scotts Valley, CA: Wings for Learning.

Cappo, M., & Fish M. (1990). The pond. [Computer program]. Scotts Valley, CA: Wings for Learning.

Joers, J., & Stone D. (1988). The children's writing and publishing center. [Computer program]. Fremont, CA: The Learning Company.

Thomas, J. (1989). Safari search [Computer program]. Scotts Valley, CA: Wings for Learning.