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Integrating a science/language arts curriculum through the use of theme cycles in a first and third grade classroom

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INTEGRATING A SCIENCE/LANGUAGE ARTS CURRICULUM THROUGH THE USE OF THEME CYCLES IN A FIRST AND THIRD GRADE CLASSROOM

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

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ABSTRACT

Currently there is a strong emphasis within our elementary school system to move toward a more integrated curriculum which includes a hands-on approach in the area of science.In order to implement a program that is not only integrated but engages the student and allows them to explore their interests, the teacher must be willing to facillate learning rather than dictating an existing curriculum.The teacher must be flexible and allow the students to transform the curriculum according to their interests.

This project was implemented based on the belief that children can create a curriculum that is meaningful. When students are given the opportunity to create their own curriculum they become responsible learners.Furthermore, they are actively involved in creating the curriculum and will become more knowledgeable about the subject matter. This will allow them to internalize what they have learned.

The intent of this project was to develop a collaborative science curriculum created by a first and third grade class.The students were provided with the global theme of Change and were invited to brainstorm topics of interests that were utilized to create a science theme cycle.

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This project introduces the reader to a theme cycle that is based on the integration of Language Arts and Science. A Theme cycle is an approach that incorporates the Whole Language philosopy of learning. Unlike thematic units which are skills based and teacher created, theme cycles take learning a step further by allowing the students to participate in creating the curriculum. This project involves both a first and third grade class and their experience in creating a unique theme cycle. The students and the teachers collaborate on which subjects to investigate.

Statement of the Problem

Teachers today are faced with a science curriculum that calls for active learning. It is a curriculum in which students are no longer passive learners who absorb information, but learners who create information. According to the California Science Framework (1990), teachers should no longer be the disseminators of information, but the facilitators of children's learning. Students should be given the opportunity to explore, experience and discover ideas and concepts for themselves.

Implementing the science curriculum is a challenge for teachers today. Teachers are given the freedom of choice. They are no longer limited by a manual that dictates a lesson step by step. They have more control over what will be

taught, how it will be taught and what materials will be used. This is an awesome responsibility that presents teachers with the opportunity to create their own curriculum and therefore provide students with active learning experiences.

As exciting and rewarding as this may be for the teacher and the student, only a small percentage of teachers actually take advantage of this freedom and use active learning techniques. In an informal survey of Chicago elementary school teachers, 100 percent of the teachers agreed that hands-on inquiry is the best way to teach science. However, these same teachers devoted only 10 percent of their time to teaching hands-on inquiry science lessons (Rossman 1993). Many teachers do not feel confident when teaching science and therefore tend to rely on textbooks. Their science lessons are solely textbook driven and are not being enhanced by activity-based learning.

Students need to be active participants in science in order to internalize science concepts and therefore become science literate. According to M. Fallon (1993), "in order for students to become science literate, they will need to experience science lessons that are hands-on, collaborative, inquiry oriented, and centered on the processes that real scientists use in their everyday work: observing, communicating, comparing, ordering, categorizing, relating, inferring and applying." Students should experience science

that is real and meaningful. Science should be genuine in that it is something that the students are interested in. It should not be something that the learners have no immediate connection to and therefore will not internalize. In order to help the students internalize what they have learned it is important that the science concepts be reinforced through integration of other content areas in a natural and meaningful way.

There are many benifits to integrating more than one content area. Integration helps develop language skills. Literature can be used to introduce science and enhance it. The English Language Arts Framework (1987) states that literature should be used to teach reading and writing. By integrating literature and science, students are given the opportunity to use their language and communication skills in an area other than language arts. The learning is authentic and meaningful.

Learning should be meaningful and relevant. A thematic unit attempts to integrate all content areas to teach skills and is centered around one topic. On the other hand, theme cycles are generated by student interests which makes learning meaningful.

> Thematic units are a means for integrating social studies or science topics into the curriculum. They consist of activities organized around one integrative topic...By contrast, theme cycles are a means for

pursuing a line of inquiry (Edelsky, Altwerger, Flores, 1991, p. 64).

Thematic units are developed by the teacher and presented to the students through different activities that are designed to create interest in the subject. In comparison, theme cycles are developed by both the teacher and the student as questions are formulated, answered and new questions are derived.

John Dewey (1963) states that "education begins with the learners' passions and questions, growing from their current position in the world--what they believe and what they value". Only then will learning extend into the future. Theme cycles is an approach that utilizes student's experiences.

Theme cycles are based on the whole language philosophy. Teachers realize that students have varying needs and experiences. A curriculum is created that fits the needs of the students, not the teacher. It is a child centered curriculum that provides students with opportunities to interact with each other and therefore learn from each other.

Children as well as adults learn by experiencing the world around them. We tend to learn more about things we are interested in. Theme cycles takes this into account. Students are given some choices as to what they want to learn. They are not given isolated facts as they study each content area. Instead they are introduced to the same

concept through different modalities. The teacher is able to cover a theme for a longer period of time thus allowing for concepts to be covered in depth. This enables students to internalize what they have learned.

Theme cycles is an approach that has taken thematic teaching a step further. Theme cycles utilize the students' interests and builds upon them. Theme cycles is a relatively new method of teaching whereby the teacher and the students together create the curriculum. Through a themestorming process, possible themes for the year are generated and voted on. The teacher and the students are then responsible for creating activities centered around these themes. The activities should be inquiry-based. The students are responsible for choosing an aspect of the theme and researching it in depth. The students then present what they have learned to their classmates in a manner which is meaningful to them.

Theme cycles allow students to have an active role in their learning. Their learning is motivated by self-interest. Harste (1991) states that "we learn what we need to survive and make sense of the world." Students will internalize what they are learning if it makes sense and is relevant to their life. Theme cycles provide the teacher with the opportunity to create inquiry lessons that will allow students to internalize what they have learned. Students are not being given the answers, but instead are

utilizing strategies to reach these answers on their own. The process is more important than the answer. Students should be able to explain and communicate to their classmates how they came to their conclusion.

Theme cycles take into account the diversities of the students. Students bring with them a variety of backgrounds and experiences. Theme cycles allows them to have a voice in what they will learn and how they will learn it. Students are more enthusiastic when their voice has been heard and they feel they have made a contribution.

Theme cycles is an approach that calls for input from both the teacher and the students. The teacher and the students work together to develop themes that will be the focus of study for the year. Theme cycles also allows for integration of the curriculum. Science is a vehicle by which the curriculum can be integrated. Language arts and science can be easily integrated allowing for reading and writing strategies to be interwoven within the science curriculum. Theme cycles operate on the basis of what the students already know and continues from there. "Learning needs to connect with, as well as go beyond, what is already known to us" state Harste, Burke and Short (1988, p. 366). Inquiry-based instruction is an integral part of theme cycles, allowing students to make meaning of what they are learning. By doing, students will remember and be able to use the information and knowledge at a future time.

THEORETICAL FOUNDATION

In order to create a classroom that is child centered, the curriculum must be a collaboration between the students and the teacher. The teacher must firmly believe that the child is the driving force of the curriculum and not the textbooks that are chosen. Goodman (1992) asserts that "Whole language teachers seek to free the minds and creative energies of pupils for the greatest gains in their intellectual, physical and social development" (p. 360). Students enter into a whole language classroom and are able to discuss their experiences in a non-threatening manner.

Whole language is a philosophy that challenges the teacher to relinquish control of the class and the curriculum. It challenges teachers to be facilitators of learning rather than dictators of learning. Each year brings new children, new challenges and new directions to follow. Whole language is a dynamic process.

It is not based upon worksheets or isolated skills. It is child centered. In her article Rigg (1991) explains that the most important factor of the whole language philosophy is the child: whereas the phonics approach emphasizes information as the most important factor. Frank Smith (1992) believes that instead of regurgitating what the teacher has told them, children retain information because they learn about subjects that interest them.

It forces the instructor to look at the children first, and see where they are, so that both the children and the teacher can create a curriculum that focuses on the children's' needs and interests. It does not begin where the textbooks say to start. A whole language teacher does not use the same activities to teach the concepts every year. They are willing to change and evolve with each new set of learners as they build a new curriculum.

Whole language is described as a circular model that has meaning at its core. Coming out of this core are new ideas that are generated by whomever is involved within this experience. Each person carries their own experience and meaning to the situation. Thus, each concept must be developed by those experiencing it.

A major component of the whole language philosophy is the premise that child needs to have a feeling of ownership. Goodman (1986) suggest that, "They [kids] need to own the processes they use: To feel that the activities are their own, not just school work of stuff to please the teacher. What they do ought to matter to them personally" (p. 31). Whole language allows the student to have ownership by letting them become authors, editors and publishers. Allowing the students to have choices on their writing topics, gives them the opportunity to write about what is important to them . This is more motivating than writing on subjects that the teacher has selected.

Hatch (1992) discusses how the whole language instructor selects a basic thematic cycle that can be recycled in many different ways. This allows the children to decide on what topics, within the thematic cycle, they would like to learn. For example, instead of forcing children to write a research report on a topic suggested by the textbooks, students are motivated to choose a topic from within the curriculum that they have helped create. According to Harp (1991) The teachers role is to guide the students learning through questions, observation, and invitations. For this reason, science and whole language can easily be incorporated together.

The teacher becomes a resource from which the students can discover new knowledge. By examining the California State Frameworks, the instructor extracts important concepts and provides the children with invitations that will expand those concepts. The instructor does this by collecting pertinent literature, audio and visual media and consulting experts whose knowledge base can contribute to the further understanding of the concepts. The instructor may also explore possible field trips that will provide either background experiences, or promote further interest of the concepts. The teacher must also support the students through self evaluation and other holistic assessments. By providing a basic framework, the instructor allows the

children to create a science curriculum that is meaningful to them.

This project is based on the belief that children will learn if they are invited to explore topics that interest them, especially in the area of science. Children will learn if they are invited to explore and take part in the curriculum process. Children that are empowered are motivated, excited and feel ownership for their learning. By moving beyond a set curriculum, the teacher becomes a facilitator of learning for all children and not just those students who come to class with the background experiences required by a predetermined science curriculum.
A child centered curriculum validates a child's feelings of worth, which will help them become productive citizens.

REVIEW OF THE LITERATURE

The review of the literature will provide an overview of the most recent research regarding child centered curriculum, integrated curriculum, and theme cycles which integrate science and language arts. Until recently, worksheets and textbooks have been the primary method for teaching science and reading. The problem arises when children do not transfer the isolated skills to daily events in their lives. "Students who can not see meaningful connections across content or skills are, of course, unlikely to be able to use their knowledge or skills to solve problems or make decisions about issues raised in the curriculum" (Lipson, Valencia, Wixon, Peters 1993 p. 252). Students are able to use the knowledge they learn more readily when they see the connection in its entirety rather than the sum of its parts.

The focal point of education has shifted from the curriculum to the learner. The learner must be engaged in the learning process in order for knowledge to be retained. Theme cycles is an approach that is inquiry based and engages the learner. "Recently, educators have been encouraged to view curriculum integration as a vehicle for significantly reshaping the nature and content of schooling, as a response to various problems of failures in traditional programs" (Lipson, Valencia, Wixon, Peters, 1993). Frank Smith (1991) advocates that instead of regurgitating what the teacher has

told them, children retain information because they learn about subjects that interest them. "Theme cycles ... are not established to rev up lagging interests but to satisfy already heightened curiousity or to answer questions raised during the pursuit of a topic" (Edelsky, Altwerger, Flores, pg. 65). Whereas, "Thematic unit centers are skills driven, they are also full of exercises of strings of activities related to one topic" (pg. 65). Theme cycles is more conducive to a child centered curriculum than thematic units because the students are the creators of the curriculum and are naturally interested in what they are learning. Freire (1970) agrees with this position. He states that knowledge should be not be imposed on the student. He proposes that students should have a voice in what they are learning. This allows them to internalize the knowledge.

Child Centered Curriculum

One of the important aspects of whole language is that it is a philosophy that can be applied to all areas of the curriculum. For example students learn to read by predicting, confirming and other integration strategies to gain meaning. This belief applies to science because children must engage in reading in order to discover new knowledge about what they are studying. Goodman (1992) asserts the following: "What whole language teachers understand is that language is developed in the context of its use and that developing knowledge depends on language

development. Thematic units that bring literacy and literature together with inquiry are central to whole language programs" (p. 360).

Because of this assertion, Rigg states that a major premise of a whole language classroom, is that children take part in the development of their own curriculum. This increases interest and personal involvement.

In their book Theme Immersion, (G. Manning., M, Manning and Long, 1994), the authors argue that children must be interested in a topic if they are to learn about it. "Teachers support students as students explore answers to their own questions. Teachers don't motivate students by dangling grades and rewards in front of them but by nurtuing intrinsic motavation (pgs. 5-6). Since children are naturally curious about the world around them, science serves as an excellent vehicle for children to begin to develop their own curriculum. "Teaching children who are doing science requires helping them generate new questions and new insights about questions they entertain, not entertaining them with a preplanned sequence of activities" (p. 67). Children have endless questions that are science related which is why science is a excellent content area to allow children to have control over what they are learning.

The belief that the curriculum should be child centered is not a new concept. Progressive education stressed that children should be interested and involved in what they are

learning because they are the most important factor. Therefore, educators must not allow the curriculum to be the driving force. As part of the fundamental roots of whole language, John Dewey's philosophy on what curriculum must consist of, and how it should be used in the classroom, follows the premise that the curriculum must be integrated throughout all subject areas and it should revolve around inquiry and problem solving. Hands on teaching is also an important component of Progressive education. Goodman (1991) discusses how, " Whole language takes the philosophy and positive, child-centered view of the progressive educators and adds the knowledge of language, of learning, of child development, and of teaching, and builds a strong scientific base under them" (p. 281).

Furthermore, Altwerger and Flores (1991) reinforce the idea of having a child centered curriculum by stating that, "Teachers must learn to trust students, trade control for collaboration, and resist efforts to plan the theme in advance. Students must learn to trust the teacher as colearner, believe in their own competence as problem solvers and learners, and resist efforts to take a passive role in the process" (p. 295).

Since the emphasis in whole language is the child and not the curriculum, teachers who practice this philosophy understand that all children do not learn in the same manner. Howard Gardner proposes that "there are seven intelligence's

(and possibly more)-linguistic, logical/mathematical, spatial, kinesthetic/bodily, musical, intra-personal, and interpersonal" (Campbell, Burton, 1994, p. 38). Children are often required to adapt to the teachers learning style, and are not given the opportunity to learn through their own strengths. Therefore, activities that encompass the intelligence's should be used. It is ridiculous to judge a child's performance solely on a linear type test when they are a spatial or kinesthetic learner. "In terms of science education, Gardner says that because the framework of science is built around the linguistic/mathematical intelligence's, students whose strengths lie in other areas may find science difficult" (Campbell, Burton, 1994 p. 38). These authors provide some guidelines on how to utilize the seven modes of learning that will give more students the opportunity to learn.

In order to incorporate strategies that encompass the multiple intelligence's, teachers must become "good kid watchers" (Goodman 1992). Whole language teachers use portfolios, anecdotal records, and conference regularly with students (Pils, 1991). In doing this, the teacher obtains valuable knowledge about the student that can not be obtained from a linear test. This informal assessment helps teachers ascertain what the students understand. Thus, a students personal growth is measured.

In addition, empowering students will change the social environment within the classroom. By empowering students with choice educators can create a classroom where, "Children are repeatedly encouraged to support each other. In the writers workshop children learn how to point out what they like in a class mate's writing. They learn how to listen to and honor each other as authors. Mostly, they learn how to respect each other in the process of communicating meanings" (Hagan, 1994, p. 246). As children help one another they internalize these skills into their own work.

The teachers role in a whole language philosophy differs from more traditional approaches. "Whole language teachers are active, not passive. They see themselves as neither authoritarian nor permissive but rather as authorities with final responsibility for maintaining a learning environment" (Hagan, 1994 p. 246). Kohn argues that, "much of what is disturbing about students attitudes and behavior may be a function of the fact that they have little to say about what happens to them all day. They are compelled to follow someone else's rules, study someone else's curriculum, and submit continually to someone else's evaluation" (1993, p.10). Because whole language allows for individual learning styles and the focus is on children's' strengths, there is an environment of support and collaboration among the students. Since children are actively engaged in learning they are not as likely to become discipline problems. An avenue which can

be used to increase active learning is to integrate science and language arts.

Integrating Science and Language Arts

Science is a vehicle that can be utilized to teach not only science concepts, but literacy skills as well. According to Shenkle (1994), a whole language approach to science can generate lots of excitement and learning. He states that "kids get motivated because they have lots of questions, and their curiosity leads to research and projects that they hardly even realize they're developing sight vocabulary, fluency, and other reading skills at the same time" (p. 68). In many classrooms today, science is being taught through textbooks. Many students experience boredom and frustration with this approach. They are not given the opportunity to use language in a meaningful environment. It has no immediate connection to their lives and therefore concepts are not internalized. Casteel and Isom state that "processes and concepts that are complex may cause many children to approach science with disinterest unless motivating, relevant instructional strategies are used (p. 538).

Science today emphasizes a hands-on/ minds-on approach that will lead to a better understanding of science concepts. Children construct meaning through their experiences and what they know about the world, however, their interpretations may

not reflect reality. Teachers need to provide students with opportunities to explore their interpretations. "As teachers, we must incorporate some knowledge of the early understandings of young children into our knowledge of the "correct" science concepts" (Butts & Hofman, p. 15). This should be accomplished, not only through textbooks, but also through hands-on activities that allow for discussion of not only the results, but of the process as well. According to Hausfather (1992), "by probing students' ideas you begin the process of conceptual change" (p. 22). Teachers serve as guides as students share and explain their theories.

Wells (1992) also states that "conversational interaction between participants, helps them formulate linguistic representations of their understanding of the matter in question and modify those representations in the light of the feedback they receive in the contributions of other participants of the appropriateness of their formulations (p. 94). Students will begin to see discrepancies between their theories and those of their peers and will begin to distinguish between truths and fallacies.

The need for change is evident. Research has determined that children will learn when the information is meaningful and relevant. Learning will occur when ideas and concepts are connected, not isolated and fragmented. In a study completed by Watson and Konicek on conceptual change (1990), discuss strategies that lead to effective learning. They

maintain that the teacher must be able to make the connection between a new idea and the children's lives. The students can then form hypotheses that stem from what they already know. Building on children's prior knowledge helps to develop logical thinking skills which can lead to conceptual change. In order to achieve this, teachers must be willing to analyze and modify their current teaching strategies.

Language arts and science can be taught simultaneously. Casteel and Isom (1994) maintain that "the literacy processes are the means by which science content is learned because content information is rooted in written and oral language" (p. 540). Language is used to research, inquire, and communicate ideas, feelings and experiences. Science is used to predict, explore and verify beliefs. The integration of these two subjects allows opportunities for meaningful literacy to occur. Children develop vocabulary necessary to communicate their ideas with others. As they experience science, they develop a need to learn and use words in print (Shenkle, 1994).

Assisting children in becoming better scientists, in effect will help them become better readers. "As learners become increasingly adept in applying the processes that lead to critical comprehension and effective communication, they are better able to read, write, and express themselves in such a way as to effectively engage in scientific study and problem-solving (Casteel and Isom, p. 540). Children will be

enthusiastic about reading if they are exposed to literature besides the basal. They are experiencing literacy as they perform science activities. Casteel and Isom state that "acquiring science information, understanding scientific procedures, and conducting experiments demand application of a variety of literacy skills" (p. 538). It is learning with a purpose. They are using language to make sense of what they are learning.

Science and language arts are both inquiry subjects. Questioning is an integral part of both areas. The best way to become literate in each area is through experience. When engaging in a reading/writing activity, the stage is set by acknowledging children's' past experiences. In science, children are asked questions pertaining to their physical surroundings that lead to identifying problems and testing solutions. By exploring their questions, children construct new understandings. "Knowledge has to be actively constructed by each individual knower as a result of his or her interactions with the external world" (Wells, 1992, p. 80).

Using literature-based instruction to teach science increases motivation. Children can relate science concepts to the events in the story. As they compare the characters in the stories to their personal experiences, they begin to make connections. Furthermore, making predictions about the plot and the characters, helps develop children's cognitive skills. "This process of predicting and validating

predictions, helps students when they must apply a similar process to hypothesize about scientific concepts" (Casteel and Isom, 1994, p. 542). Literature can also be used to help promote classification skills. Before children can make comparisons between objects or ideas, they must first be able to classify them.

Literature can be used to introduce a science concept or idea and writing can be used as an extension. Once children have had experience with a concept or idea, they can then put into writing what they've learned, questions they may still have or what they would like to learn in future activities. Scarnati & Weller (1992) propose that the four purposes of writing: narration, descriptive, explanatory and persuasive, can be successfully integrated into science. As children become familiar with science concepts, they can write about: real-life events, descriptions-focusing on facts, introductions explaining the concepts or the process in specific steps, and can create new sympathies or insights. "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). Current trends in science have made the integration of language arts and science increasingly important.

Science Reform

Children are natural scientists. They are constantly questioning, inquiring and investigating the world around them. The desire to learn lies within each child and should be cultivated. Science is a vehicle through which childrens natural interests can be explored. Children learn best by experience, not by direct instruction.

Knowledge cannot simply be transferred from one person to another. According to Wells (1992), "knowledge has to be constructed--or reconstructed--by each individual knower through a process of interpreting or making sense of new information in terms of what he or she already knows" (p. 94). Children bring with them a wealth of ideas and experiences. They are empowered to learn when they realize that their beliefs, interests and opinions are important. Given the chance, children can make a valuable contribution to their education.

Science is a forum in which children could have a voice. Traditionally science was taught to children, not experienced by children. Today science is a cooperative effort. The teacher and the children together create and experience the learning process. Rossman (1993) states that "as the teacher's role changes from that of presenter to guide, the role of the student changes from passive recipient of

information to participant in the creation of understanding" (P. 35). Furthermore, he maintains that there is a shift from an emphasis on teaching to an emphasis on learning.

The teachers' role has changed from that of leader to that of participant. Teachers should be ready to expect the unexpected. Childrens' curiosities may lead the class to study concepts and ideas that the teacher may not be familiar with and this may cause the teacher some anxiety. As Pearlman and Pericak-Spector (1992) stated, " the words, 'I don't know; let's find out,' are the first step in a quest for knowledge that has infinite possibilities" (p. 36). By becoming a students guide and resource, the teacher can help the children look for information they need. The teacher can model strategies on how the children can locate resources that will help them find the answers to their questions.

Science should be taught using a hands-on/minds-on, inquiry approach. This method of teaching allows children to experience science. The activities in which the children participate are open-ended and allow them to provide their own interpretations. Teachers who use these methods of teaching are encouraging children to wonder, question, investigate, test and explain. They are creating a community of thinkers who will not be afraid to take risks and will not be afraid to challenge ideas and thoughts. Donivan maintains that "as students ask questions, design experiments, observe and record data, and evaluate and draw conclusions, they

exercise higher-level thinking skills" (p. 29). Children are given the opportunity to think for themselves.

Children, as well as adults, have misconceptions that they hold to be truths that are not easily challenged. Utilizing a hands-on/minds-on, inquiry approach gives teachers the opportunity to "challenge a child's misconceptions" (Butts and Hofman, 1993, p. 15). Prior to and following an activity, children share their knowledge and beliefs about the subject matter. Teachers should listen carefully to the conversations that take place during and after the activity because as Butts and Hofman (1993) concluded, "it is the conversation after the activity that makes a difference in their thinking" (p. 16). It is during this time, when the children interpret and voice what they have learned, that the teacher can truly assess whether or not there are still misconceptions.

Inquiry-based instruction provides for diversity in teaching. Childrens' strengths lie in different areas and therefore they learn through different "sensory modes" (Samples, 1994). Providing children with different approaches to learning allows them to use their strengths. Samples feels that instructional diversity can transform textbooks into resources. Children can use the textbook to help them in their path to learning, but are not limited to the information found within the textbook. By giving children a choice, the door is wide open for learning to occur.

Teaching quality science is a challenge. The teacher is faced with learners who come from diversified backgrounds and whose experiences are unique to each individual. Teaching science as a hands-on/minds-on, inquiry approach enables children to have a voice in their learning and it also validates their experiences. The excitement, the magic, and the joy of learning will be evident as the teacher and the children create knowledge together. Theme cycles can be used to create a meaningful science curriculum.

Theme cycles

Altweger and Flores describe theme cycles as "An approach to the study of content that is consistent with the theory and practice of whole language... In a theme cycle study, topics are not exploited for the purpose of fulfilling literacy and subject area objectives (as in more traditional themes). Rather, oral and written language, as well as the various content fields, are regarded as vehicles for studying and researching the topic" (1991, p. 295). Utilizing theme cycles as an approach to teaching allows for individuality. Students share knowledge, and formulate questions. As they continue to share, the students may discover common themes which can develop into theme cycles.

The classroom environment is an important aspect of the learning process. Altwerger and Flores (1994) address the issue of creating an environment that promotes enthusiasm for learning about the students world. They argue that theme

cycles are a successful way to involve the students in creating a curriculum that allows, "students to become confident and resourceful learners capable of constructing knowledge, tackling complex problems, and critically examining issues" (1994, p. 2).

Anderson's (1994) article reinforces this concept as it recounts how her third grade classroom developed the program "Alemeda Earth Expo "91" in which the students utilized various community organizations. They also collaborated with students in other classrooms and performed skits, while others wrote letters to the president (p. 29). It was a hands-on program that enabled students to search for and use resources that were available to them in the community. This is further corroborated by Cudog (1994), who states that "we want to organize learning and teaching experiences that will help our students make connections with the real world and that will incorporate their knowledge" (p. 20). These experiences should provide opportunities for problem-solving strategies and processes, critical reflection and include their creative talents (Cudog, 1994).

Altwerger and Flores (1991) also discuss the key elements of theme cycles and how it differs from thematic teaching, or units. "Unlike the traditional theme units, which are often disconnected and unrelated to subsequent units, theme cycles studies often develop into subsequent studies, as new and related questions and problems are posed"

(p. 4). This allows the students to understand that many subjects are related to one another. Furthermore, students are involved with the creation of new subjects and questions which allows the students and the teachers to be both learner and teachers. Altwerger et al., concludes that this process creates what Freire calls "A pedagogy of knowing" (p. 3). Freire advocates that education should not be a place where the teacher knows everything and the students are to take in this knowledge as though they are sponges.

In her article on theme cycles, Castro demonstrates how all subjects can be integrated in a way that is natural. "One of the goals of theme cycles is to integrate the different content areas and disciplines within the theme but not force this integration" (Castro, 1994, p. 10). In this article, Castro discusses how different stations can be used to represent different areas of the content designed to explore the collective knowledge that the students and the author had generated. These stations provide hands-on experiences for the students through the various content areas. This enables the concepts to be reinforced through all the learning modalities.

Integration of content areas is also discussed in Altwergers et al., (1994) article. Once again the authors state that, "Unlike traditional theme units, which are often disconnected and unrelated to subsequent units, theme cycle studies often develop into subsequent studies, as new and

related questions and problems are posed" (1994, pg. 4). These related questions and topics are generated by the teacher and the student in response to their desire to learn about different subject matter.

In conclusion, in creating an integrated science curriculum the California State Framework (1990) advocates the use of themes. Integration of content areas is also a fundamental element in the English-Language Art Framework (1987) "This approach is particularly well suited to coordination with science instruction, as science investigations provide meaningful contexts for reading, writing, speaking, and listening and help students to develop their language arts skills related to non-fiction" (p. 196).

Theme-Cycles integrate the curriculum in a meaningful way because it is inquiry based. As each theme cycle comes to an end new theme cycles emerge as old questions are answered and new questions are considered. This creates a curriculum that is connected and allows children to use their prior background knowledge. As a result the curriculum is meaningful and children will internalize knowledge. More students can participate in this process if the curriculum is child centered. Throughout this journey teachers and students are both learners and teachers, as they work together to create a curriculum that is applicable to their own lives.

GOALS AND LIMITATIONS

The purpose of this project is to demonstrate how theme cycles can be used in the primary grades to integrate science and language arts in a meaningful context. This project will provide teachers with ideas and activities that will involve students actively in their learning. It provides numerous invitations for children to experience an inquiry based curriculum that has been developed by both the teacher and the students. Using an inquiry based curriculum students will be provided with opportunities that will develop their written and oral communication skills. By using hands on activities, the students develop critical thinking skills. In addition, it will enable teachers and students to learn from each other in a risk free environment. This project can provide encouragement to those teachers that are willing to allow students to have a voice in creating a curriculum that is meaningful.

A limitation of this project is that it is geared towards primary classes and may not be suitable for grades 4-6. Furthermore it is unique to our classes and cannot be duplicated in its entirety because it was written by a particular group of students. Teachers may select various components of this project such as the themes, resources, and activities created in this project. However, the results may not be replicated since students' experiences vary and each

group of students will create a unique curriculum. Also, teachers must be willing to share the responsibility of designing a new curriculum with each new class. This project was developed in an effort to integrate science and language arts and does not address other curricular areas. Teachers may be hesitant to use activity based learning because it involves using materials that may not be readily available. This is especially true of science materials.

Another limitation of this project is that each theme cycle is only four weeks long. However, each theme cycle can be extended for a longer period of time in order to explore the concepts further. The last limitation is that the resources on theme cycles are limited. Because of the lack of articles on the subject, many of the authors have been quoted on several occasions. This is a result of theme cycles being a relatively new strategy, therefore only several articles have been written about the subject.

Evaluation

Assessment has been an integral part of this project. The assessment choices are comprised of both informal and formal strategies. The California Science Framework (1990) stresses that there is more than one method to evaluate students. The weakness in using only standardized tests is that these tests only focus on what the child is able to recall from memory and not what they have internalized. "Written work, particularly when not limited by the time and response constraints of a classroom test situation, can provide deeper insights in the creative processes and integrated understanding of students" (p. 210). In this project, journals and learning logs were used in order to allow students to express their comprehension of the unit of study. These evaluation tools were also used to record lingering questions and their reflections about what they had learned. "Evaluation occurs as learners take reflective stances in relation to their work and then invite others in to have conversations about it" (Crafton, Burke, 1994 pg. 4). Self reflection is an important component of the evaluation process because students become aware of their own progress.

Fuhler (1990) describes how students can learn this technique of self evaluation through individual conferences with the teacher. By using this technique, the teacher and students develop the criteria necessary for assessing a paper

that is ready to be published within the classroom. This process is applicable to science because the students may decide to publish reports on what they have been studying. By conferencing with peers and the teacher, children learn to be conscientious about their own writing and learning.

Another form of assessment in this project is the use of anecdotal records. Anecdotal records are useful because they allow the teacher to learn what the children understand. By observing students daily the teacher can obtain a clearer picture of students growth (Pils, 1991, p. 48). In order to do this one must become a kid watcher. As students interact with one another the teacher can gain insight into what has been learned. By "observing their pupils, watching for learning and growth and signs of need and potential"(Goodman, 1991, p. 207) the teacher can begin to know the students.

In accordance with the district policy portfolios are used as a form of assessment. Portfolios are a valuable assessment tool in that they measure growth over a period of time and not one isolated lesson. Anecdotal records, self-evaluations, reports, learning logs, formal tests, and reading and writing samples can be included in portfolios. Portfolios are not limited to these particular assessment tools.

The California Science Framework (1990) states that "by varying the format of assessment, teachers can assess and appreciate the varied abilities of all students, and they can

better plan how to help individual students improve their abilities in a variety of contexts" (p. 210). By using numerous forms of assessments, a more accurate perspective of the students' knowledge is gained.

APPENDICES

APPENDIX A

OUR EXPERIENCE
IN
CREATING
CURRICULUM
FOR FIRST
AND
THIRD GRADE

I. Introduction

A. Personal beliefs

1. On how children learn

2. Teacher's responsibility toward learning

B. Planning of project

1. Why science was chosen

2. What the appendices include

II. Reflections

A. Journey toward the Whole Language experience

1. Moving from skills towards Whole Language

III. How did our theme cycle emerge from the students

A. Initial Steps

1. Brainstorming

2. Authoring Cycle/Literature groups

3. Reading Logs

4. Learning centers

B. Inquiry Stage

1. Process of planning things together

2. Problems

3. Evaluation

IV. Future Goals

A. Summary of what has happened and how to apply

We believe that children are the most significant element within the classroom. Learning must supersede any curriculum plan because children are the heart of education. Children should be given a voice in creating the curriculum in order to foster learning. Many times their enthusiasm is stifled because they are not given the opportunity to explore their interests. If the curriculum is not relevant and significant to the children then, they will not become empowered learners. By allowing children to become involved in the planning of the curriculum, it becomes real and important to them. When children feel secure, they are more willing to take risks and re-evaluate their understanding of the subject matter.

In order to create a meaningful learning environment we must begin with what the children know and serve as facilitators of learning. We must inspire the desire to learn new concepts that are built upon their previous knowledge.

When we began creating our project, we decided to focus on science because it is an integral facet of our world. Children are naturally curious and are eager to explore their surroundings. Science lends itself to hands-on experiences which enables students to become active participants. Their is an enormous amount of literature that includes scientific concepts. This is true of both fiction and non-fiction literature.

We integrate science with other curricular areas and implement a wide selection of literature to supplement the concepts. For example, picture books, fiction, nonfiction, biographies, informational, children's magazines, folklore, chapter books, and textbooks. Visual materials are used such as charts, posters, picture cards, videos and laser discs. Experts were also invited to speak in the classroom. The implementation of these materials is based upon the curriculum that we have created with our students.

This project is a summary of our experience in developing an integrated curriculum that is child-centered. We invited our first and third grade students to take part in creating their own curriculum. The students were also given the opportunity to help choose how they would be assessed. Our three appendices include ideas, resources, and strategies that we used as we explored the earth, plants and rain forests through theme cycles. Sections will also contain an outline of the main ideas, annotated bibliographies collected by both the students and the teachers. It should be noted that our appendices are not all inclusive, rather, they provide examples of what our classrooms developed.

The implementation of theme cycles in our classrooms

The initiating activity for our theme cycles was presented as an invitation to the students. We presented the students with a general topic so that they could begin the process of brainstorming possible ideas. The first grade

students were provided with a mini lesson on how to brainstorm before the actual process occurred. All ideas were recorded and categorized. The students voted on the subject matter which intrigued them the most. These became the topics for our theme cycles.

Even though we provided the mini lessons on brainstorming, it was still difficult for the students to generate complex ideas. We feel that this is a reflection of the infrequent use of strategies that allow the students to take part in building their own curriculum. Another problem that we encountered was that it was difficult to include all ideas into the categories that our classes developed. As a result, not all ideas were utilized in the preliminary stages of our theme cycle. However, in the later stages of our theme cycle, all students were given the opportunity to select and explore the topic of their choice.

After the brainstorming was completed, our classes began their theme cycles. We collaborated on the potential avenues that would allow us to explore, discover and celebrate the subject matter we would be studying. In order for the students to feel successful we felt that it was important to provide them with some guidelines and strategies that are a fundamental part of a child-centered curriculum. We presented mini lessons to demonstrate how the authoring cycle, literature groups, learning and reading logs can be used.

The authoring cycle provides the students with the opportunity to share their writing in a non-threatening environment. Students give and receive feedback on what they have written in a small group setting. They can consider whether or not they want to make the suggested revisions.

Literature groups are comprised of several students reading and discussing their interpretation of the literature selection. Once they have become experts on their topic they are able to present what they have learned through conventional and alternative meaning systems. These include art, drama, music and written reports.

Learning logs are used to record what the students have learned and their reflections on the activities in which they participated. Reading logs are used to answer open-ended questions in response to what the students have read. They can also be used to record personal reactions to the literature piece. The learning and reading logs promote critical thinking because they both require personal interpretation by the learner. The students are not restricted to a single answer nor are they limited to simply summarizing the story. This fosters creativity in the learner.

We along with the students developed learning centers in order to enhance the subject matter. Learning centers are valuable because students are able to explore new meaning systems as a means to show understanding. For example we

utilized the art center to demonstrate how to use play dough to create environments and volcanoes. Mediums such as paint and chalk were used to create talking murals, enhance reports and create underwater environmental scenes for the rain forest.

Both classes had a science center that included an area designated for resources that were brought in by the students. In another science center natural materials such as seeds, rocks/pebbles, rice and other food products were used to help implement the scientific procedure. By using these different strategies we have provided students with a foundation from which they can expand their knowledge base.

Once our students became more confident with these basic strategies, we proceeded with our theme cycles. Many of the ideas that were suggested by our students dealt with the external components of the earth, such as rocks and volcanoes. In addition to bringing books from home, we collected literature from the school and public libraries. We formed collections of rocks in our area. After our collection was complete, we observed and classified the rocks. The students were curious about how the rocks were formed, this led us to a study of the internal components of the earth. We were able to obtain numerous materials on our subject matter including videos, laser discs and articles. We invited an expert on soils from UCR and a parent who is an avid rock collector to share their expertise. Students

learned how to identify different types of soils by creating ribbons and noting the texture and the color of each soil sample. Students also learned how to identify the minerals found in rocks through the use of a fluorescent light. They decided to make volcanoes and were able to identify the types of volcanoes and label the internal structure. We explored all the options that were presented and participated in activities that were interesting and enjoyable which enabled the students to learn the concepts in depth.

As is true in most new situations, there are inherent problems. It is an on-going challenge to motivate students to work independently and explore a topic in depth without constant instruction from the teacher. Most students have not had enough experience to go beyond the familiar and are used to being fed information rather than searching for knowledge themselves. The management was at times chaotic and new guidelines had to be set by the classes. We were continually reflecting and discussing the days events in order to provide each other with support and new ideas.

For each element of the theme cycle our classes plan and decide on the major concepts to be learned, the activities that we are involved in, and the students collaborate together and work independently to obtain their goals. When we had finished with the earth's internal and outer structure the first grade students decided to investigate the plant kingdom, while the third grade students wanted to see if

volcanoes existed in the rain forest. Throughout our theme cycle we were able to naturally integrate Language Arts with Science. Social Studies and Math were also inherently integrated because of the wide spectrum of activities that the classes developed. Our classes have made tremendous strides in becoming self-reliant learners and we have allowed the students to take more control over what they are learning. Along with the students we have grown and have gone beyond the familiar.

Our methods of evaluation

Evaluation is an ongoing process in our classroom. We utilize various means to evaluate the students. The following examples are not all inclusive but they do represent some of the evaluation tools that were implemented in our theme cycles.

1. Self evaluation:

This is an integral component because it helps the students take responsibility over what they are learning. Self evaluation also enables the student to readily see their progress. Because students have previously been invited to select how they present what they have learned, it is easier for them to self evaluate their progress.

2. Teacher observation:

Students present what they have learned by using a method of their choice. We then have an informal discussion with each student to evaluate whether they can relate what

they have learned to other areas. "Kid watching" is a useful tool in that we can observe a student as he/she is participating in a cooperative learning activity.

3. Conferences with students:

Conferencing is an important tool because it allows us to see where the students are in their learning. By focusing on the progress they have made, as well as their needs, we are able to guide their learning.

4. Learning logs and journals:

The main function of learning logs is for students to record what they have learned during a particular activity. These logs also include their observations and experiments. Journals were used by students to reflect their opinions, ideas and thoughts. Journals are useful because they help us see how much they understand. Finally, students keep reading logs in order to write down their interpretations, questions and feelings about the literature they read.

5. Report cards:

Even though report cards, as they are in our district, are not consistent with the whole language philosophy, they are required. We determine some grades on a rubric, whereas other grades are determined on a more traditional scale. As we continue to grow as instructors, we hope to develop a better way to incorporate our philosophy

with our grading system. One attempt to do this has been implementing portfolios.

Future goals

As we reflect on all that we have accomplished, we find that we still are not completely where we want to be. But, we are comforted by the knowledge that we have made tremendous leaps in our methods of teaching. We have seen that a theme cycle can be implemented and it is more exciting and rewarding for all parties if it is a collaboration. Our immediate goals are to continue to develop strategies that promote critical thinking and independent learners. This project only represents the experiences of two classes. There are many other avenues which can be explored. Theme cycles can be created by students and teachers on oceans, the human body, insects, and arthropods. It can focus on pollution, and other environmental issues. The wonderful aspect of theme cycles is that it is only limited by the students and the teacher who both take part in its development.

APPENDIX B

PLANTS

PLANTS

I. What are the characteristics of plants?

- A. Observable structures
  - 1. Functions
- B. Needed resources
  - 1. Oxygen, soil, water, sun

II. Life cycle of plants

- A. Seeds
  - 1. Composition

III. Importance of plants

- A. Food
- B. Medicine
- C. Products

Fiction

Ehlert, L. (1987). Growing vegetable soup. New York: Scholastic.

Describes the plants in the garden that can be used for soup.

Interest Level: Primary.
Related Topics: vegetables, gardining.

Krauss, R. (1945). The carrot seed. New York: Scholastic.

This book is about a little boy who plants a carrot seed and how he takes care of it.

Lionni, L. (1992). A busy year. New York: Scholastic.

Discusses the changes a tree goes through month to month.

Interest Level: Primary.
Related Topics: Seasons, trees, months of the year.

Rockwell, A. (1991). Apples and pumpkins. New York: Macmillan.

A families outing to an apple orchard and pumpkin patch.

Interest Level: Primary.
Related topics: farms

Non-fiction

Bailey, J. (1988). Anticipating the seasons. New York: Facts on file.

Explores how animals and plant life adapts to the changing seasons.

Interest Level: Primary.
Related topics: weather, yearly calendar, changes

Bjork, C. (1988). Linnea's windowsill garden. Stockholm, N.Y.: R & S Books.

An illustrated introduction to plants and how they grow with information on creating a home garden.

Interest Level: Primary.
Related topics: soil, plants, gardens

Branley, Franklyn. (1975). Roots are food fenders. New York: Crowell.

Explains in simple terms the function and importance of roots and root hairs on a plant.

Interest Level: Primary.
Related topics: roots, soil

Budlong, W. (1970). Experimenting with seeds and plants. New York: Putnam.

Suggestions for establishing a plant laboratory and conducting experiments of varying length and complexity that reveal the secrets of plant growth.

Interest Level: Primary.
Related topics: science fair, planting seeds

Carle, E. (1987). The tiny seed. Natick, MA: Alphabet Press.

A simple description of a flowering plant's life cycle through the seasons.

Interest Level: Primary.
Related topics: seeds, plants, art, nature

Challand, H.J. (1986). Plants without seeds. Chicago: Childrens Press.

Examines the characteristics of simple plants that do not have seeds (algae, fungi, lichen, mosses, and ferns).

Interest Level: Primary.
Related topics: botany, ecology

Cooper, J. (1991). Flowers. Vero Beach: Rourke Enterprises.

Introduces wildflowers, their parts, their homes and families, and their seasonal changes.

Interest Level: Primary.
Related topics: parts of flowers, gardens, changes

Gibbons, B. (1984). How flowers work: A guide to plant biology. New York, Blandford Press.

Focuses on botany.

Interest Level: Intermediate
Related topics: photosynthesis

Grace, T. (1993). A picture book of Flowers. Troll Associates.

Describes various flowers, including the daffodil, sweet pea, and pansy, discussing how and where they grow.

Interest Level: Intermediate
Related Topics: Flowers, juvenile literature.

Hellen, R. (1983). The reason for a flower. New York: Grosset and Dunlop.

Brief test and lavish illustrations explain plant reproduction and the purpose of a flower and present some plants which don't seem to be flowers but are.

Interest Level: Intermediate
Related Topics: flower development

Heller, R. (1983). The reason for a flower. New York: Scholastic.

Describes the life cycle of a flower from pollination to its end product.

Interest Level: Primary, intermediate.
Related Topics: Pollination, Flowers.

Heller, R. (1984) Plants that never ever bloom.

Describes various types of plants that do not produce seeds and how they reproduce.

Interest Level: Primary, intermediate.
Related Topics: molds, spores, sea life.

Janulewicz, M. (1984). Plants. New York: Gloucester Press.

An introduction to the world of plants and how and where they grow.

Interest Level: Primary, intermediate.
Related Topics: earth science

Maestro, B. (1993). How do apples grow? New York: Scholastic.

Discusses the life cycle of an apple.

Interest Level: Primary.
Related topics: Fruit, plants, seeds.

Relf, P. (1995). The magic school bus plants seeds. New York: Scholastic Inc.

How living things grow.

Interest Level: Primary
Related Topics: juvenile literature

Rothenberger, R.R. (1982). Starting plants froms seeds. Washington, D.C.: U.S. Department of Agriculture.

Fact sheet for part-time farmers and gardeners.

Interest Level: Intermediate.
Related Topics: soil, environment

Sabin, L. (1984). Plants, seeds, and flowers. Mahwah, New Jersey: Troll.

Describes briefly the evolution of plants, the different types of seeds they produce, how seeds travel, take root and reproduce.

Interest Level: Primary
Related Topics: seed germination

Potential Laser Discs.

Windows on Science

Primary I 2.1.1-2.1.5. What is a plant? Laser Disc.

Primary I 2.3.1-2.3.5. Type of plants. Laser Disc.

Primary I 2.4.1-2.4.3 Importance of plants. Laser Disc.

APPENDIX C

OUR EARTH

Our Earth

I. The composition of the earth.

A. Layers of the earth

1. Internal structure

2. External structure

II. Rocks and minerals

A. How they are created

B. Types

C. Identification

D. Environmental effects

E. Usage

III. Fossils

A. Formed

1. Dinosaurs

2. Palentologist

IV. Platectonics

A. Volcanos

1. Classification

2. Internal structure

B. Earthquakes

1. How they occur

ANNOTATED BIBLIOGRAPHY

OUR EARTH

Fiction

Brandenberg, A. (1972). Fossils tell of long ago. New York: Scholastic.

An introduction to the various types of fossils and how they are excavated.

Interest Level: Primary, Intermediate.
Related Topics: Earth Science, Dinosaurs.

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.

Dunrea, O. (1989). Deep down underground. New York: Macmillian.

Animals present the numbers from one to ten, as earthworms, toads, ants, and others, march and burrow, scurry and scooch deep down underground.

Interest Level: Primary, read aloud.
Related Topics: Math, chanting.

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,
Related Topics; Minerals, composition of the earth

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: Primary, intermediate.
Related Topics: Minerology

Non-Fiction

Bell, R. (1994). Science close-up: Volcanic rocks. Racine, Wisconsin: Western Publishing Company.

The different types of rocks that come from volcanoes.

Interest Level: Intermediate, primary.
Related Topics: Volcanoes, rocks.

Lambert, D. (1986). Rocks and minerals . London; New York.

Describes in simple language the composition, formation, and structure of different types of rocks and minerals.

Interest Level: Primary.
Related Topics: Volcanoes

Lye, K. (1991). Rocks, minerals and fossils. New Jersey: Silver Burdett Press.

Includes Bibliographical references and index.

Interest Level: Intermediate
Related Topics: Rocks, Geology

Marcus, E. (1983). Rocks and Minerals. New Jersey: Troll.
Questions and answers provide basic information on rocks and minerals, including their formation, properties, and identification.

Interest Level: Primary, Intermediate.
Related Topics: Petrology and Minerology.

McGowen, T. (1981). Album of rocks and minerals. New York: Checkerboard Press.
Describes the formation and uses of the world's leading rocks and minerals.

Parker, S. (1993). Rocks and Minerals: Investigating the fascinating world of rocks and minerals. New York: Dorling Kindersley.

Classifies rocks, introduces reader to rock collections and discusses changes that occur in rocks over time.

Interest Level: Intermediate, read aloud.
Related Topics: Precious gems, metals and soil.

Podendorf, I. (1958). The true book of rocks and minerals. New York: Children's Press.
An introduction to the formation and identification of a variety of rocks.

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

Vrbova, Z. (1990). Volcanoes and earthquakes. Mahwah, New Jersey: Troll.

Discusses how and where volcanoes and earthquakes occur and other aspects of these disturbances in the earth.

Interest Level: Intermediate, Read Aloud.
Related Topics: Volcanoes, earthquakes.

Whyman, K. (1989). Rocks and Minerals . New York: Gloucester Press.

Includes index on the different types of rocks and minerals.

Interest Level: Intermediate
Related Topics: Mines and Mineral resources.

Potential Laser Discs.

Windows on Science

Primary I 5.1.1-5.1.7 Places on Earth. Laser Disc.

Primary II 4.2.1-4.2.8 Changing landforms. Laser Disc.

Primary II 4.3.1-4.3.9 Weathering and erosion. Laser Disc.

Primary II 4.4.1-4.4.4 Minerals and rock. Laser Disc.

Primary II 5.1.1-5.1.4 Fossils. Laser Disc.

Primary II 5.2.1-5.2.13 Dinosaurs Laser Disc.

Appendix D

THE RAIN FOREST

Rainforest

I. Composition of a rainforest

- A. Emergent layer
- B. Canopy
- C. Understory
- D. Forest floor

II. The rainforest as an ecosystem

- A. Life cycles
- B. Interdependency
- C. Food chains

III. Man's responsibility

- A. Respect
- B. Interdependence
- C. Conservation

ANNOTATED BIBLIOGRAPHY
RAINFORESTS

Fiction

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
Related Topics: Rainforest Ecology, Ecosystems, Human Responsibility, Australia.

Bogart, J. E., & Daigneanlt, S. (1945). Sarah saw a blue macaw. New York: Scholastic.

Describes animals in the rainforest using poetic rhythum.

Interest Level: Read aloud, primary.
Related Topics: Chants, ecology.

Cowcher, Helen. (1988). Rainforest . New York: Scholastic.

A story of the animals of the rainforest fleeing from man's destruction. As the deforestation continues the animals wonder what will save them if the trees are all cut down.

Interest Level: Read aloud, primary and intermediate.
Related Topics: Deforestation, ecology, man's environmental impact.

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

Describes the characteristics, various forms of plant and animal life, and destruction of the world's rain forest.

Related topics: ecology.

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 has an environmental impact.
nterest level: All ages. Read aloud.
Related Topics: Environment, Extinction.

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

A young boy dreams about the future and comprehends the importance of taking care of the environment.

Related Topics: Environment, pollution, conservation.

Yolen, J. (1993). Welcome to the green house. New York: Scholastic.

Describes the environment and the animals that live in a rain forest.

Interest level: All ages. Read aloud.
Related Topics: Ecology, animals, plants.

Vyner, T. (1994). The tree in the forest. New York: HarperCollins Publishers.

A brightly colored book that uses a rhymic chant to describe the various animals of the rain forest.

Interest level: Primary and intermediate. Read aloud.
Related Topics: Habitats, ecosystems.

Nonfiction

Aldis, R. (1991). Rainforests. New York: Dillon Press.

Examines the plant and animal life of the rain forests and the threats to their continued existence.

Interest level: Primary and intermediate.
Related Topics: plants, ecology.

Amsel, Sherl. (1993). Rain Forests. Texas: Raintree Steck-Vaughin.

Describes the world's rain forests, their importance, plant and animal life, and conservation.

Interest level: Primary and intermediate.
Related topics: conservation, ecology.

Donati, Annabelle. (1992). I wonder what a rainforest is and other facts about plants. Wisconsin: Western publications.

Amazing but true facts about the wide variety of plants, seeds, and the rain forests.

Interest Level: Read aloud, intermediate
Related Topics: Habitats, plants.

Goodman, B. (1991). Life in the rain forest. Florida: Rourke Enterprises.

Describes the living conditions, plant and animal life in the rain forest.

Interest Level: Primary, intermediate
Related Topics: ecology, plant life, habitats.

Landau, E. (1990). Tropical rain forests around the world. New York: P. Watts.

Discusses the environmental conditions of rain forests, the plants and animals that live in these forests, and the dangers of deforestation.

Interest Level: Primary, intermediate
Related Topics: Life cycles, environments.

Mattherw, R. (1990). Tropical Rainforests of the world. Surrey: The Book People Ltd.

The rain forest and its inhabitants are described and seen through extrodinary photographs and text.

Interest Level: Primary, intermediate
Related Topics: Photography, habitat.

APPENDIX E

EXAMPLES OF AUTHENTIC ASSESSMENT

Adapted from Reading Clinic 625

MY SCIENCE PROJECT

Title_____

I did this project because_____

_____.

This is how I feel about my project and why:

_____

_____.

This project was:

_____ easy _____ hard _____ other

How could you make this project better?

_____

_____

_____.

? ① What did I learn today that I didn't know?

Answer② I learned that there can be more that 30 different ants on one tree. I didn't know that the trees stay green all year. I didn't know that bia animals live on the forest floor. I learned that the water can get that high in a year. I learned that it gets hot dering the year. I didn't know the trees can cover the canopy. I didn't know that half the animals of the world live in the rain forest. I didn't know the plants are in the rain forest that people don't know of.

Adapted from Reading Clinic 625

Plants

Learning Log

Name_____

What I learned?

How I came to learn it?

Adapted from Reading Clinic 625

Earth

Learning Log

Name_____

What I did:

What I learned:

How I felt:

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Butts, D.P., & Hofman, H. (1993). Hands-on, brains-on. Science and Children, 30(5), 15-16.

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

Campbell, M., & Burton, V. (1994). Learning in their own style. Science, 31(7), 24-40.

Casteel, C.P., & Isom, B.A. (1994). Reciprocal processes in science and literacy learning. The Reading Teacher, 47(7), 538-545.

Castro, E. (1994). Implementing Theme Cycle: One Teacher's Way. Primary Voices, 2(1), 7-11.

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