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DESIGN AND DEVELOPMENT OF A UNIT MODEL FOR
INTEGRATED INSTRUCTION

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
Elementary Education

by
Dana Katharine Thomas

May 1992

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by
Dana Katharine Thomas
May 1992

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PARCHMENT DRILL

Abstract

DESIGN AND DEVELOPMENT OF A UNIT MODEL FOR INTEGRATED INSTRUCTION

Dana Katharine Thomas

Teachers are confronting problems related to implementing an integrated curriculum. The help and support teachers need is definitely not met by materials commercially available. There is a need for a clear model for integrated units of instruction which will enable teachers to design their own integrated units around a central framework. This project will discuss integration and problems related to its implementation. It will identify the problems teachers face regarding design and development of materials when integrated curriculum is implemented. It will present a literature review that will differentiate integrated curriculum from the whole language philosophy and the thematic teaching method. It will also detail factors in state and school district mandates regarding integration, and evaluate integrated curriculum. The project will present the process of designing and developing a model instructional unit and will present a finished instructional model of integration, including all steps in the design and evaluation process.

With love and endless thanks

to

Carol, Lorie and Colleen

Without your help, your never-failing support and your constant encouragement this never would have happened.

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CHAPTER ONE

INTRODUCTION

Teaching has never been more challenging than it is in the nineties. Reforms in education which are taking place challenge educators into reassessing methods and beliefs that have formed the cornerstones of education for generations. Educators often find themselves in the midst of innovations that could be exciting, frustrating, rewarding and frightening all at once.

The shift towards integrated instruction in education is an example of a curriculum reform in the nineties. It involves innovative changes affecting curriculums, teaching materials and instructional methods. Its implementation changes not only specific subjects such as reading or language arts, but all curriculum areas. These changes are also having an impact on instructional designs which, when used for classroom instruction, must demonstrate the interrelationship of all learning.

Integrated curriculum also requires new ways of thinking about teaching, eliminating boundaries between subject areas. It requires educators to have a great store of flexibility, creativity and the

willingness to change and to accept new ideas. Integration brings many opportunities for educators to participate in developing better, stronger and more exciting learning opportunities for their students.

Integrating the curriculum is seen to be the beginning of what could be a turning point in United States education as it moves into the next century.

Integrated curriculum and the impact of its implementation, particularly in relationship to teachers and curriculum development, will be the focus of this project. It aims to provide a model that will make it possible for teachers to implement an integrated curriculum in their classrooms. It assumes that when given the clear guidelines for instructional design, the prototype model of an integrated unit, and the rationale why the model is educationally sound and will result in improved student learning, teachers will call forth their own creativity and inspiration to do what they do best--develop curriculum that meets the needs of their students, meets educational goals, and inspires children to search for even more knowledge.

Chapter One of this project defines integrated curriculum, describes the benefits of integrating language arts and science, and discusses one common problem teachers face when implementing

integration: the availability of suitable teaching materials and resources.

Chapter Two presents a review of literature that further describes integrated curriculum, the factors that contributed to its increased support, and research that supports or questions its implementation.

Chapter Three describes the process of designing and developing an integrated model unit and provides the actual unit plan, along with results of a formative field testing. The chapter ends with a summary and recommendations to teachers when using the model.

Integrated Curriculum

Defining Integrated Curriculum

The definition of integrated instruction or integrated curriculum is evolving. It is the outgrowth of new teaching methodologies and educational philosophies, some based on current research, some on past research still considered valid, and some on trends and beliefs espoused by popular educational consultants.

Integrated curriculum, as described by these sources, includes a number of elements.

The first element of an integrated curriculum is that it emphasizes the connection between all learning. It is a curriculum which works for a broader understanding of all subject matter and towards the development of the ability to move past surface information and see the interrelationships among all subject areas (Perkins, 1991).

Second, an integrated curriculum is based on learning outcomes which frequently cross over curricular lines to reflect continuity and relevance of information among various content areas (Brandt, 1991). Rather than teaching a set of strict, specific learning objectives that are written within the framework of each subject area, students work toward accomplishing certain performance objectives that demonstrate learning across several curriculum cross-groupings (Spady & Marshall, 1991). Students are no longer evaluated on isolated skills and subjects, but rather in broader areas that reflect interrelationships in their learning.

Third, an integrated curriculum integrates learning with the students' personal system of meanings, giving relevance to their

learning experience and the world around them (Beane, 1991).
Curriculums must not become homogeneous, because children live in different environments and need different information that is relevant to their own lives (Brandt, 1991). A well-designed integrated curriculum will "focus on the problems, issues, and concerns of students" (Vars, 1991, p. 14). It is designed by people directly responsible for implementing it, by those in the environment where it will be taught (Jacobs, 1991).

These three elements provide the bases for identifying what is an integrated curriculum. They also relate to the criteria that determine what a quality integrated curriculum is.

Quality in an Integrated Curriculum

Related to the elements which define an integrated curriculum are some criteria that determine its quality. The first criterion is that a good integrated curriculum is taught with wholeness and unity. In order for students to understand the interrelationship of what they learn, the curriculum must not be fragmented or disjointed (Beane, 1991). Second, the curriculum must be personally meaningful to

students, teachers and administrators who are involved with it (Beane, 1991). Third, the content must be educationally significant and contain solid subject matter (Brophy, 1991). The last criterion requires that an integrated curriculum foster learning of specific goals in all areas concerned and not simply use one subject as a vehicle for teaching another (Brophy, 1991).

Integrating Language Arts and Science

Two areas which lend themselves well to an integrated curriculum are science and language arts. Recent changes in science instruction in the schools and the increase in children's literature with science themes can now provide the environment, as well as some of the resources, for successful integration. Furthermore, there are a number of teaching and learning benefits that could result from the integration of these two curriculums.

Why Integrate Language Arts and Science

At present there is a move to take science learning from the laboratory into an environment where it is relevant to human affairs

(Hurd, 1991). Scientists themselves are integrating the disciplines within their own fields as teachers are seeing the need to integrate science instruction with other subjects, particularly language arts (Hurd, 1991 and Greene, 1991). Within this move to create a unity of knowledge, rather than a collection of disjointed facts, is an ideal place for integrating science and literature. The interweaving of stories and nonfiction with scientific fact is an excellent means for demonstrating interrelationships (Greene, 1991). What students read in a story will help them recognize and further understand the science information when presented during science instruction. In the same way, knowing the scientific background of a concept will enhance students' comprehension and enjoyment of literature (Greene, 1991).

Integration of language arts and science can be accomplished by organizing reading instruction around science themes or topics. Themes frequently relate to literature selections, but can just as easily be based on science topics (Walmsley and Walp, 1990). The reading of literature can be a welcome variation to the text, and can support the science concepts being presented. Books with science themes are a particularly good means of presenting nonfiction literature to students.

A variety of writing tasks relating to the science concepts provides an avenue for the development of writing skills and competency.

Benefits to Students

The ability to read and understand both fiction or nonfiction and to communicate this understanding in writing is the basis to learning in all content areas (Walmsley & Walp, 1990). The material students read should be from their own experience and world, and should support the other instruction in the classroom, not be separated from it. Their writing should be in relation or response to what they read, and this process should take place across the curriculums, not just in an isolated period called "Reading." Integration of the language arts with science permits all reading and writing to have a definite purpose. Children will not just read because they have a reading book, or write because it is time to write. They will read to gain knowledge about the science topic, and write to convey the knowledge, or respond to what they have learned, or to create their own composition for an audience. Integration permits learning for a purpose, and makes that purpose evident to the students.

Integration of learning is logical and appeals to a sense of order. Adults can recognize the interrelationships in their own experiences and understand why one lesson applies to another. Educators are recognizing that children also are capable of this understanding and learn better when the curriculum is presented in an integrated manner.

It is logical that there be a connection between language arts and science in an integrated curriculum. The ability to read and write well contributes to learning in science. Literature provides a fascinating and motivating introduction to and support for science concepts. Science materials, processes, and activities are excellent vehicles for the use and development of reading. Literacy skills can be taught and reinforced through science lessons.

The integration of science and language arts benefits student learning in many ways. They achieve a better understanding of interrelationships and they see more clearly the purpose of their learning. Yet, in classrooms today, science instruction and language arts instruction may still be confined to particular times of day, frequently separated by a recess or lunch, and seldom linked for

children to see the amazing and extensive interrelationships within human knowledge.

Benefits to Teachers

An integrated curriculum also benefits teachers. The diversity of integrated units provides a framework for the creativity of individual teachers and teams (Greene, 1991). The positive reactions to collegial support and teamwork enhance the work environment and help develop constructive attitudes (Greene, 1991). Programs in existence for several years have also shown that teaching an integrated science-language arts curriculum increased elementary teachers' comfort level with teaching science (Greene, 1991). A team from the American Association for the Advancement of Science, when evaluating an integrated science-language arts program in a northern California school district, reports "the insightful use of science, substantive science, as the conceptual focus for instruction in reading, arithmetic, social studies, and other subjects" and "an approach to changing the attitudes, skills, and knowledge of elementary teachers that promises to be more than superficial and fleeting, that seems to

foster teacher creativity, and that may be affordable (Greene, 1991, p. 44).

The benefits from an integrated curriculum in science and language arts in the form of improvements in student learning and teacher attitudes are too strong to ignore. Yet, to many teachers, these benefits remain unknown.

The Implementation of Integrated Curriculum

The California State Department of Education has affected the implementation of an integrated curriculum. The most recent state frameworks for the teaching of content areas such as science and social studies are clear in their call for content area concepts to be integrated with other curricular areas (California State Department of Education, 1987). The frameworks reflect consensus among curriculum planners that instruction should not isolate each subject area, but rather it should show children that all subjects are interrelated and that the concepts and abilities learned in one area are useful and valuable in learning all subjects. Implementation has its impact on all people involved, particularly the classroom teacher.

The Impact of Implementing an Integrated Curriculum

The implementation of an integrated curriculum impacts the school setting in many ways and on several levels. The impact starts with the administration, whose job it will be to present and interpret integration to the staff. At the district level of administration, this will involve planning how teachers will be trained in the implementation of the new method and how they can be supported with appropriate materials, resources and personnel. Ultimately, it will be the teachers who will be impacted the most. It will be their job to participate in planning, collaborative projects, do inter-grade level articulation and curriculum development, and communicate the changes to students and parents in a positive manner. It will be the responsibility of the individual teachers, alone in the classrooms and facing thirty students, to put these plans into action, to actually teach an integrated curriculum on a day-to-day basis, implementing the myriad ideas, methods, suggestions and plans with their own students. It will be they who will need new or revised instructional designs and materials to make this implementation not only possible, but successful. It is for the sake of these teachers that the implementation process must be planned carefully.

There are several factors that need to be considered for the successful implementation of an integrated curriculum. The first factor is the rate at which an integrated curriculum will be implemented. The vast amount of information and material teachers are expected to absorb and implement at one time makes it difficult for teachers to adopt new materials or methods (Brandt, 1991). Taking the implementation in small steps that are designed for success, even in limited amounts, will create a more positive atmosphere for change (Fogarty, 1991). Second, there must be vertical articulation and a team approach between grade levels when designing and implementing the curriculum. This will avoid repetition of material and allow for crossover in subject areas, particularly in schools that use departmentalization and team teaching to divide subject areas (Brandt, 1991). Third, teachers must be trained and helped to change. This is not a process which can take place in isolation. This then leads to the fourth factor, i.e., that the implementation of an integrated curriculum must be viewed as a collaborative effort (Brandt, 1991). Teachers must come out of isolation and contribute towards creating an integrated curriculum that is both relevant and exciting for their schools (Jacobs, 1991).

Problems in the Integration Process

Once the implementation of integrating curriculum is initiated or actually takes place in a school, its impact will be felt greatly by the classroom teacher. It is now the job of this teacher to actually integrate the curriculum she teaches, and it is here where integration may falter or come to a complete stop. This can be caused by one or several of a variety of factors.

One common problem encountered by teachers when integrating curriculum relates to textbooks. The State of California Board of Education adopts series of textbooks for use in the public schools. Usually, several texts are prescribed, permitting individual school districts to choose the one they feel best fits the needs of their particular population. Adopted texts are chosen to fit the guidelines set forth in the state frameworks, and are expected to accomplish the goals given. Because each district may choose a different text series for each subject, it is likely that students will have books from several different publishers. While these texts may meet the standards set by the state and/or district, they are not designed to support integration because they were written for individual subjects and were designed by

different authors and publishers (Goodman, Shannon, Freeman & Murphy, 1988).

Consequently, it is up to individual teachers to design lessons that will integrate, for instance, their language arts basal with their math, social studies, health and science texts. Even if books for different subject areas are published by the same company, they may not necessarily be designed to work together. Unit length, format, topic coverage, vocabulary, sequence, and supplemental materials usually differ. Using textbooks that are not designed for integration can result in differences in the timeline designated for each unit. For example, a story in the language arts book on the ocean, including all the related activities, may take a few days to teach. Integrating this with a science unit on oceanography would be logical and would certainly contribute to thematic instruction. However, a fifth grade level oceanography unit might take four or five weeks to teach adequately. Meanwhile, the reading text has moved on to selections on other topics. This results in fragmented curriculum. The teacher may have to move from one content area topic to another to align with the reading basal, which would not give the students a sense of continuity or interrelationship. This also creates a maze of material and

information that teachers must sort through in order to create an integrated unit of instruction.

The use of textbooks becomes an important issue when teachers implement an integrated curriculum. Textbooks are considered to be the means by which teachers will meet the goals set by the state and school districts. They provide consistency in instruction, assuring that, for example, second graders will be taught the same science concepts throughout the state. Vast amounts of money are spent on them each year. However, for purposes of achieving an integrated curriculum, they could fall short in providing teachers with the materials they need.

In addition to textbooks, teaching a truly integrated curriculum also requires other resources. The Reading/Language Arts Framework calls for a literature-based program which uses trade books and other supplemental reading materials (California State Department of Education, 1987). New guidelines for science instruction mandate the use of manipulatives (California State Department of Education, 1990). Yet, there are few funds available for the purchase of extras beyond the textbook. Teachers attempting to use additional resources find themselves buying it out of their own funds or working without them.

This lack of materials needed for the adoption of the integrated approach is definitely a problem that teachers face when they try to integrate their curriculum.

Statement of the Problem

Teachers are confronting problems related to integration. One particular problem is the availability of suitable and quality materials to support integration. Teachers are devoting time and energy to finding solutions, but there is very little literature to indicate widespread or consistent success resulting from their efforts. An informal survey of publishers' catalogues, teaching supply stores and the Riverside County Schools Curriculum Library yielded information on the existence of only single units of instruction utilizing one book, but not necessarily in conjunction with a content area theme. There were also books with several units based on literature, but these contained only a few worksheet type activities, again without a unified theme. The help and support teachers need is definitely not met by materials commercially available. There is a need for a clear model for integrated units of instruction which will enable teachers to design their own integrated units around a central framework.

Statement of Goals and Objectives

This project will discuss integration and problems related to its implementation. It will identify the problems teachers face regarding design and development of materials when integrated curriculum is implemented. It will present a literature review that will differentiate integrated curriculum from the whole language philosophy and the thematic teaching method. It will also detail related factors in state and school district mandates regarding integration, and evaluate integrated curriculum in terms of advantages and disadvantages presented in the research literature.

In addition, the project will present the process of designing and developing a model instructional unit that contains both science and language arts goals and a series of literature-based integrated lessons and activities designed to reach those goals. The project will also present a finished instructional model of integration, including all steps in the design and evaluation process.

CHAPTER TWO

REVIEW OF LITERATURE

The purpose of this chapter is to review literature relating to integrated teaching. It is organized under the following topics: differentiating integration from whole language and thematic teaching, factors that contributed to increased support of integrated curriculum, and research that supports or questions the implementation of integrated curriculum.

Differentiating Integrated Curriculum

The term integrated curriculum is frequently confused with or used in place of whole language instruction or thematic teaching. In actuality, these are different components of an instructional program. To understand integrated curriculum it is necessary to define the differences between the three terms.

Whole Language Instruction

Whole language is more a philosophy than a technique. It is a

belief that the learning of language must be accomplished as a whole process, not as fragmented or isolated bits and pieces. It is based on four premises (Goodman, 1986).

The first premise is learning theory. In order to learn, a language must be developed. Without language cognitive development is not possible. This puts language development as the first priority in teaching children.

Language development is the second premise on which whole language programs are developed. The teaching of language is based on scientific knowledge of how children acquire language. This recognizes that writing is an integral part of the language development process. The steps in learning to read and understand and thus to learn must be taken together; they cannot be separated into individual lessons (Goodman, 1986).

The third premise is that the responsibility for keeping language development whole belongs to the teacher. It is the role of the instructors to create authentic, relevant language learning experiences for the students. It may be necessary for them to do this in the face of public and administrative resistance, but their concern for each child they teach must prevail. Teachers are also responsible for a learning

that is individualized, where children learn at their own rate within a natural, meaningful environment.

The fourth premise is that a natural, meaningful learning environment has to be created by the curriculum. This translates to language being learned through the entire curriculum, not just during the portion of the day designated as reading time. This supports integration, i.e. that the curriculum is to be viewed as a whole, and all the elements must be connected and relevant to one another. It must be meaningful and interesting to the children. Learning tasks must have a purpose that is obvious to the children as well as to the teacher. When this is accomplished children will be motivated and eager to learn (Goodman, 1986).

Thematic Teaching

Thematic units are a method of whole language teaching. Kovalik (1988) feels that children learn best when their learning is centered around a unifying theme. This theme would permeate the entire school day, week or month for a designated length of time. For example, a three week unit on the solar system would involve reading about it, writing about it, using math skills to conduct scientific

investigations, discussing it, creating art projects with space as a theme, and perhaps singing space songs and playing space games. Also referred to as immersion, this method allows students to experience a topic in greater depth than a textbook would permit. When thematic teaching is fully utilized it can be an effective method of accomplishing whole language instruction and be a tool in integrating curriculum. However, it is time consuming in terms of teacher planning because of the need to integrate diverse and initially unconnected materials and methods of presentation in the basal texts and supplementary materials. This frequently discourages teachers from fully implementing thematic teaching.

Whole Language and Thematic Teaching in an Integrated Curriculum

Since whole language instruction is a philosophy and thematic teaching is a method, then integration is the process through which an integrated curriculum is accomplished. The process of integrating the curriculum will include acceptance of the whole language philosophy and a decision to use the method of thematic teaching to deliver the curriculum. It will be a curriculum that contains the common elements defined earlier: teaching towards a connection in all

learning, based on learning outcomes, integrated with students' personal system of meanings. With thematic teaching, an integrated curriculum also meets the quality criteria set forth previously. The curriculum must have wholeness and unity in its goals and objectives, as well as having a theme. The curriculum is designed to be personally meaningful to the students and educationally significant, containing solid subject matter.

The Support for an Integrated Curriculum

The literature on integrated curricula indicates that it started gaining attention in the eighties as a result of the following factors: changes in views about learning, dissatisfaction with existing teaching materials, and the implementation of curriculum reforms.

Changes in Views About Learning

Educators are reexamining the way children learn, particularly the way in which they learn to use their language. The constructivist theory of learning, based on Piaget's work, is receiving more attention, proposing that "...learning is not simply a matter of accruing facts and

details and storing them in the mind. Individuals must experience, feel, and integrate new knowledge into their cognitive systems" (Ganapole, 1989, p. 81). The emphasis should be on active participation in learning and use of prior experience to comprehend new information. Consequently, teachers cannot isolate facts, skills, vocabulary words and concepts and expect students to understand that they are interrelated with either new knowledge or with what the students have previously learned. There must be an interaction between the learner and the information being presented.

Consistent with the constructivist theory, Fuhler (1990) cites that there has been little proof that children learn to use language well when the reading and writing process is broken down into tiny pieces such as phonetic structure or decoding. Constructivist theory and research also indicate that changes in the way curriculum is presented to students is necessary as we learn more about the way they acquire and use language (Ganapole, 1989). Reform in the way children are taught cannot address just one subject or skill or concept, it must view the entire school curriculum as a whole. Hence, the need for integration--the natural connection between language as expressed in

literature and the vast body of information contained in content area instruction.

Dissatisfaction with Existing Materials

The inability of existing curriculum materials to meet learning needs as more information about how children learn emerged has likewise contributed to the support given to integrated curriculum . One curriculum material, the basal reader, is now seen as a collection of "...stilted, unimaginative sentences..." (Fuhler, 1990, p. 313) that children find boring and uninspiring. Even the quality of supplementary materials which accompany basals, such as workbooks, worksheets, vocabulary drill and comprehension exercises, does little to inspire children to read more.

Most recently published basal series still contain many of the same methods of skill and concept presentation (e.g. worksheets, comprehension questions, objective tests) their predecessors had (Goodman, et al, 1988). The only major change they represent is the use of literature excerpts or selections rather than stories written specifically for the reading series. In doing so, it was expected that the reading would become more interesting and motivating to the

students, who will still have to continue completing worksheets and drills. The isolating of skills and stories in reading can be interpreted as teachers having "lost sight of what students were to do with these reading skills--namely, to engage in literacy activities such as reading books, magazines, newspapers and so on" (Walmsley & Walp, 1990, p. 253). The use of basals seems to defy the intent of educators to create students literate in all areas. Reading and writing skills must be seen as means to "...gain access to, enlarge, and communicate knowledge--of literature, of history, of geography, of science, of culture, even of themselves" (Walmsley & Walp, 1990, p. 253). It is necessary that teachers see the basal as a tool, not as the main element, of language arts curriculum. An integrated curriculum would use the reading basal as perhaps a starting point for a unit. The science text could be used as an initial source of basic concepts and vocabulary. From this foundation, an integrated unit that uses a wide variety of sources, information and instructional materials can be built. It is not reasonable to expect students to learn from only one source--the basal text (Walmsley & Walp, 1990).

Implementation of Curriculum Reforms

Reports about the performance of American students on a variety of tests painted a dismal picture of what they were learning. They did not compare well with students of other nations, and the gaps between ethnic groups were alarming. The concern over this performance of American students led educators into instituting and implementing reforms that will help improve student performance. However, reforms initiated after the publication of *A Nation at Risk* in 1983 have not had a substantial impact on student learning. It appears now that some solutions were proposed or implemented without attention to the steps necessary for successful change. These reforms were expected to do too much too quickly and required drastic changes in the social and cultural structure of the schools (Deal, 1986).

Educational changes which focus more on curriculum reform seem to hold more promise than the solutions of the eighties because reforms in curriculum could be based on research and practical, classroom experience. Changes in the curriculum require changes in the social perception of how children are taught and major changes in teaching method and it has been proven successful over time in a variety of classrooms (Deal, 1986; Walmsley & Walp, 1990). Consequently, more

attention is now being given to what is included in the curriculum (Lewis, 1990). Curriculum reform is strongly viewed as one of the possible measures that will solve the problem of students who are not learning what they should.

Integrated teaching is the curriculum reform being implemented in schools recently, based on the premise that integrating subjects will avoid the "layer cake phenomenon [where] the curriculum is treated as a collection of discrete content areas in which teachers move from one to another in lockstep fashion" (Lewis, 1990, p. 535). Within the traditional context, lessons were often developed in isolation from one another and failed to help students relate their new learning to what they already know.

Curriculum reforms in California include a proposal that requires the alignment of texts, teacher's manuals and assessment devices. The Department of Education has also made integrated instruction an integral part of the new state frameworks. The California State Department of Education *English-Language Arts Framework* (1987) states,

As the human mind seeks unity among the parts for a wholeness of understanding, so do the English-language arts

require integrating all the elements of language before students can make sense of the processes of thinking, listening, speaking, reading, and writing.

For science instruction, the Department of Education *Science Framework for California Public Schools* (1990) supports integration in stating that,

...themes are necessary in the teaching of science because they are necessary in the doing of science. In order for science to be a philosophical discipline and not merely a collection of facts, there must be a thematic connection and integration.

A similar step towards curriculum reform through integration was taken by the National Center for Improving Science Education by recommending that elementary science instruction be given "equal billing with reading, math and writing" (Lewis, 1990, p. 537). When this call for curriculum reform is enacted, the potential for integrating science across the curriculum would increase.

On the district level, school district frameworks are written to meet the state guidelines. They include similar statements calling for reforms through the integration of instruction (Moreno Valley Unified School District English-Language Arts Framework [MVUSD], 1989).

There are definitely continuing efforts for curriculum reform which support the adoption of an integrated curriculum. The successful implementation of these reforms now rests heavily on teachers who need to be provided with the methods and materials for integration.

Research on Integrated Curriculum

Concerns Regarding Integrated Curriculum

As with any educational change, there are objections and resistance to integrated curriculums. One of the most common arguments against literature-based instruction is that use of literature to integrate the curriculum presents reading materials which are too difficult for the children to master. This, however, is refuted by the following summary of research which demonstrates the educational soundness of integrated instruction. Another frequent complaint is that there are inadequate amounts of classroom materials, particularly class sets of literature selections. This is sometimes true, especially with current budget restraints. A third argument is that literature-based instruction cannot portray minorities and diverse cultural

groups as well as a basal series can (California State Department of Education, 1988). Close examination of children's literature, both fiction and nonfiction, published in the last five years, shows this to be untrue. It is true that teachers or districts must take care when selecting literature for their programs that reflects their community's ethnic structure, but there are adequate resources with which to do this (California State Department of Education, 1977).

So far, research offers little support for these arguments partly because the integration process has not been a widespread practice until the late eighties (Berg, 1988). A more significant point to consider, however, is that these arguments are frequently met with the enthusiastic rebuttal of teachers and children who have found it to be a successful, meaningful way to learn (Goodman, 1986). There is research that demonstrates that children do learn at least as well if not better with integrated curriculum. Despite the objections and resistance to integration, there definitely are advantages and benefits that support its implementation.

Advantages and Benefits

Teaching an integrated curriculum has many advantages to offer

teachers. Research has shown integrated instruction to be educationally sound. It is an effective way of reaching the higher and lower students in the classroom because it can be taught to a total group, yet directed to each child individually. It is a means of creating a coherent whole from a frequently fragmented or shallow curriculum without abandoning the subjects and curriculums teachers are required to teach. Teachers are finding it to be a successful way to present, reinforce and expand concepts being taught. The following sections further explains these advantages.

Integrated instruction is educationally sound. Research has shown that children must do more independent, silent reading to succeed in all areas. The National Commission on Reading in its publication *Becoming a Nation of Readers: The Report of the Commission on Reading* (1985), states that the best predictor of growth in reading comprehension, vocabulary size and reading achievement is the average minutes per day spent in reading books. A program of integrated instruction which includes sustained reading of literature related to the content area would facilitate this growth. Children would be reading to learn, not to fill in blanks on worksheets.

Language arts and content area skills may still be taught in an integrated program. When these skills are taught within the context of reading, they become relevant and purposeful, and become keys to successful learning. The material used to demonstrate or illustrate skill lessons will be that with which the children have established a relationship and familiarity. There is a better sense of wholeness in this manner of instruction.

Integration presents to children the perspective of "skills-through-application" (Walmsley & Walp, p. 267, 1990) which shows them that what they learn is applicable to problems they must solve in daily life. This is especially evident in writing, where the editing process will teach them to spell, capitalize and punctuate without isolating those skills from the children's own writing--the place where they are actually used.

Fuhler (1990) states, "well-written books provide strong language models on which children can base their own writing (p. 314)." Integrating science and language arts instruction provides a good ground for this. For example, after reading children's science journals, students will be better equipped to write their own reports and observations. They will have read and heard scientific vocabulary

and terminology used correctly in context. They will have seen that writing can serve a purpose, e.g. publication. They will have this model after which to structure their own writing, including content, form and mechanics. They will actually have the opportunity to apply the skills they have learned.

In a small upstate New York town, one school implemented integrated instruction successfully. The North Warren Project is the effort of third and fourth grade teachers to initiate a program that would integrate language arts with content areas such as science. This was begun at the request of their superintendent after observing the success of a remedial reading teacher who used only full-length literature as her primary instructional material. The teachers chose themes, planned instructional units, selected content area reading material, developed appropriate writing activities that supported the content and obtained training in teaching strategies designed for whole language instruction. They then embarked on the implementation of the program.

Because this was not an experimental group, there was no control group with which to compare them. However, after one year the students participating in the study showed good progress in reading

on standardized tests routinely given in the district. The children also read a substantial number of books. Remedial students also showed growth and read numerous books. Teachers were enthusiastic about the program and felt that even if positive results could not be documented with standardized testing, it could be shown that the children did not deteriorate academically. The most striking support for the integrated program is in the fact that North Warren Central School District has fully implemented integrated instruction in grades K-6 and is in the process of developing a program for grades 7-8. There is certainly strong evidence why integration is considered to be educationally sound (Walmsley and Walp, 1990).

Integration can reach a large range of students. One of the arguments against literature based instruction was that the material would be too hard for the lower students. Research has effectively refuted this, showing instead that literature integration can increase achievement of lower, disabled or non-English speaking students. It provides a means for teachers to instruct the total class in one area, then direct teaching to the individual child and the particular needs of that child. For example, a lower achieving child might write one paragraph to describe the water cycle, while a gifted child might write a

longer and more in-depth description. Both may include the same basic information, it is simply presented in a manner consistent with their achievement level. Both children will learn to capitalize, sequence, punctuate and spell during the writing process, but the product will reflect individual abilities. Their sense of ownership and pride will be similar, even though the children have responded at different levels. It will not have been necessary to isolate the low readers from the rest of the class by putting them in a separate group or giving different assignments. All children can experience success in this setting.

As early as 1968, Dorothy Cohen has conducted a study with academically retarded, low socioeconomic students in New York City. The experimental group was given a literature enrichment program while the control group continued use of basal texts, demonstrating the effect of a literature-based program. At the end of the school year, the experimental group showed statistically significant gains in reading over the control group. Reading ability increased in content area reading as well. This study was later replicated with other similarly controlled groups and similar results were reported (Cohen, 1968).

Another study dealing with special populations was done by Nancy Larrick in New York City in 1987. The Open Sesame project was developed to give literature and language experience based immersion to 225 non-English speaking kindergarteners. By the end of first grade, sixty percent of the students were reading at or above grade level as measured by the district comprehension test (Tunnell and Jacobs, 1989).

These studies show that diverse populations of children can learn to read with a literature-based approach. An integrated curriculum will naturally include many literature selections since they provide such a vast resource to teachers and students.

Children with reading disabilities can also benefit from integrated instruction. Tunnell (1986) used a literature based reading and writing program in a fifth grade class that included eight children identified as reading disabled. After a seven month period, the standardized tests were administered. The average overall gain for all of the children was 1.1 grade equivalent. The reading disabled children alone achieved an average gain of 1.3 grade equivalent. These results hold promise for children who have been traditionally at the bottom of the class.

Students who are failing reading are another group integration can help. In a study of five third grade children who demonstrated average ability but showed no growth in reading since the first grade, Chomsky (1978) found that a neurological impress method using taped literature in support of the regular program was helpful in initiating growth in the children's reading achievement. After one year of treatment these children had made an average growth of 7.5 months in overall reading. For children who had shown no growth since first grade this was a remarkable achievement.

These studies demonstrate that there is strong support for integrated instruction. Integration can be an effective tool for successfully teaching all children without the isolation some so frequently have experienced. This is encouraging for teachers who have struggled to find effective instruction for the hard-to-teach child.

Integration contributes to teaching across the curriculum. One of the greatest advantages of integrated teaching is that it permits teachers to develop units that encompass all curricular areas. When integrating Science and Language Arts, for instance, a science theme of Space Journeys could be chosen as a topic, and then an integrated curriculum implemented by reading nonfiction or science fiction

books about space travel, writing factual accounts of space exploration and imaginary space journals, reading biographies of astronauts, creating a crayon resist space scene to illustrate a report, playing "Space Invaders" during physical education and singing songs about the solar system during music as well as teaching the basic science concepts of astronomy. This type of teaching permits teachers to explore subjects to a depth far beyond that provided by a basal textbook. Tyson and Woodward (1989) while discussing why textbooks are not effective learning tools, state that "textbooks have become compendiums of topics, none of which are treated in much depth (p. 15)." Integrated instruction allows for depth, and for both students and teachers to express their creativity in their responses to the material.

When students experience integrated instruction across the curriculum they develop an interest in a wide range of learning materials. The students develop personal interest in the books they choose (Fuhler, 1990). The ability to establish interests and to choose their own reading material in diverse subjects will serve them well as adults as they pursue lifelong learning.

Integration personalizes the content curriculum experience and brings it within the understanding of students. Personalization is one

of the key elements of whole language instruction, but one of the most difficult to achieve in highly technical content area curriculum.

Ceprano and English (1990) state that, "Personalizing the expository facts of the...studies through literature can make the unembellished facts more meaningful to students of all ages." For example, fifth graders find the interrelationships of plant and animal life in a forest ecosystem a difficult concept to grasp. They tend to consider each living thing as a single entity and do not see its dependence on others. Reading *My Side of the Mountain*, in which young Sam Gribley lives alone in the forests of the Catskill Mountains, helps them understand how dependent the members of the forest community are upon each other. The concept has personalized scientific information through literature, and therefore has become far more meaningful.

Integration can also assist in the development of vocabulary across the curriculum (Smith, 1990). The exposure to science terminology in the context of a picture book or a poem will make the science terms more meaningful when encountered in expository text. Illustrating and labeling molecules, nuclei and protons makes the words real and understandable when they are used in more technical material. The wider the variety of presentation models in which

children encounter and utilize a word the more likely it is to become a part of their personal and working vocabulary. Integration provides many opportunities for children to use new vocabulary.

A successful integration across the curriculum was accomplished as a Master's degree project at California State University at San Bernardino in 1990. The author designed a thematic cross-curricular unit of instruction for social studies which included reading, writing, math, science, art, music, drama and physical education activities. The project was field tested in the spring of 1990 in a local elementary school third grade. In an interview with the author, she stated that she was enthusiastic about the students' response and the quality of the products they had created during the unit. The results of standardized testing show that her students did as well or better than the previous year's class (G. Martin, personal communication, May, 1991). While this is not statistically significant, it does show that her method of instruction did not cause children's scores to drop. The success she experienced with this program is encouraging enough that she is presenting it in district inservices to other third grade teachers. She found that it is possible to successfully use integrated instruction across the entire curriculum.

Summary

This chapter discussed integrated instruction in relation to thematic teaching and whole language instruction. They represent three components of an instructional program but their interrelationship is close. Berg (1988), in discussing integrated curriculum, provides a definition of integrated curriculum which succinctly describes this relationship:

In a generic sense, [integrated instruction] is any curriculum development effort in which two or more previously separate subjects are combined. It also means providing for learning situations in the classroom in which aspects of different content areas are developed together for real purposes and real audiences. It has to do with making coherent wholes out of parts.

This definition of integration serves this project well. The effort to combine language arts instruction and the science content area curriculum will create opportunities for lessons with real purposes and audiences. Students will integrate language processes--reading, writing and discussing--into the context of science instruction (Goodman, 1986). The methods and beliefs of whole language and thematics will be used in a cooperative coexistence within the integration, but the

overall purpose will be to integrate science and language arts in the manner Berg described above. A coherent whole, with a real purpose, will be evident to the students when the subjects are fully integrated.

This chapter has also identified factors that lead to continued support for integration. Integration help teachers meet the demands for improved changes in the way students are taught. Learning theory and research indicate children learn differently than was previously believed. The traditional basal reader is under attack for fragmenting the reading process which is viewed as a process of integration rather than a collection of skills. Disillusionment with what children are learning and their progress in comparison to other nations has brought about curriculum reforms. In California the State Department of Education has clearly stated that an integrated curriculum is a major goal. Local school districts have mandated integration to implement these goals.

The advantages of integrated instruction demonstrate the importance of its consideration in any educational program. Research has shown that it is educationally sound and produces positive results in students and teachers. It is a teaching method that encompasses all children equally, eliminating the negative labeling of low readers and

providing opportunity for growth and enrichment to higher achievers. It is a strategy that contributes to the teaching of all curricular areas and enables students to see the educational process as a meaningful whole. Surrounded as they are with these dramatic changes, teachers are now exploring various means to implement it.

CHAPTER THREE

DESIGN AND DEVELOPMENT OF THE UNIT MODEL

Achieving the Goals and Objectives

This chapter describes the process used to design and develop an integrated unit model. This was based on Dick and Carey's (1985) model for instructional design. A step-by-step description of the development process which led to the unit model is likewise provided. Limitations to the unit model are indicated to help readers adapt this instructional design and development process, as well as the unit model, to their own teaching.

Design of the Unit Model

Procedures in designing the unit model were based on Dick and Carey's Instructional Design Model (1985). The procedures include (1) identifying instructional goals, (2) identifying entry behaviors and characteristics, (3) writing performance objectives, (4) developing criterion-referenced test items, (5) developing instructional strategies and (6) materials, and (7) designing and conducting formative and

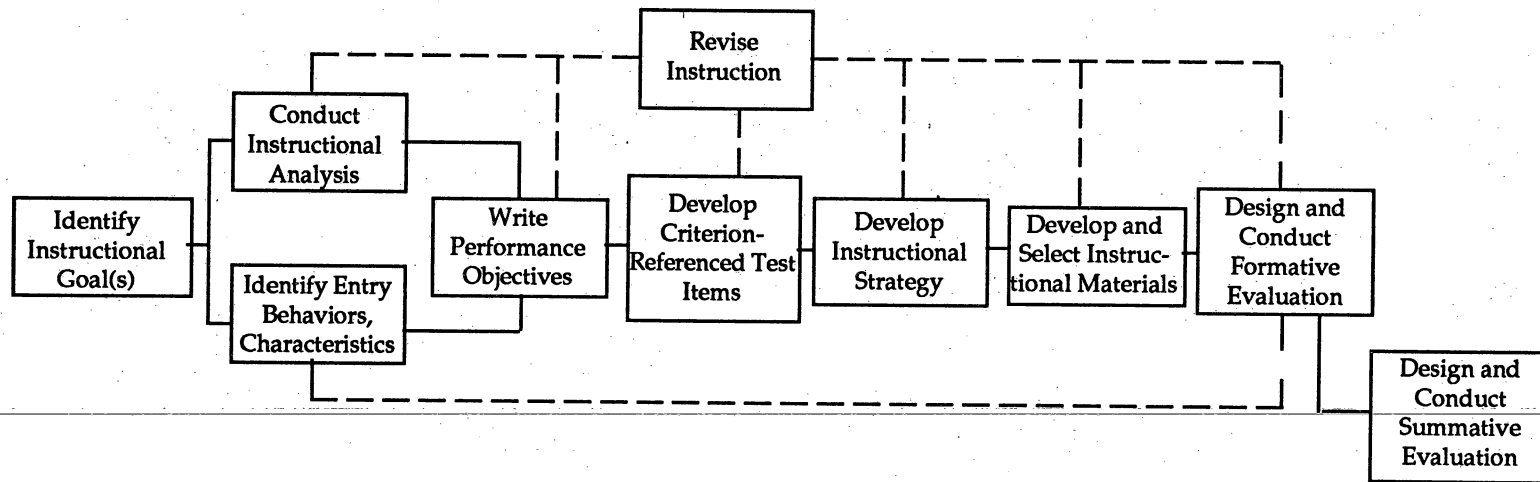
summative evaluation (see Figure 1). Each step in the instructional design model and how they were implemented in the development of the unit model are discussed in the following sections.

Prior to the development of the project decisions regarding subject matter and topics to be integrated were made. Science and language arts were the logical choices for the integration because of the benefits involved, the state's and the school district's decision to utilize whole language instruction, and the availability of a new science framework now being adopted all supporting integration.

Identifying an Instructional Goal

The first step in instructional design is to identify the behavior students will be able to do when the unit is completed (Dick & Carey, 1985). This decision may be based on what teachers are required to teach by their school, district or state, by their own assessment of their students' needs, a teacher's own interests, or by current issues in society or education. Dick and Carey (1985) describe this as the "what is" and "what should be" of a situation. Teachers must identify what students are already doing and what it is they should be doing.

Figure 1. Dick and Carey Instructional Design Model



The process of choosing goals for the unit model began with the district language arts and science frameworks. Because these are readily available to all teachers, they provided a resource for identifying appropriate goals. Examination of the science goals in the science text in comparison with science goals in the district and state frameworks led the instructor to choose those which she considered were needed by the students and were suitable for integration with language arts. Similarly, analysis of the state and district language arts goals was done.

Both affective and cognitive goals were identified since an integrated unit does better to address both. However, for this project, emphasis was limited to cognitive goals. In the cognitive learning domain, two major goals were selected from the framework: (1) Students will demonstrate and apply knowledge of scientific and environmental concepts and understanding of human/environmental relationships. (2) Students will demonstrate understanding of scientific text and related literature by reading, discussing, speaking, listening and writing.

The unit model theme was The Vanishing Rain Forest. It coincides with the final chapter of the first unit on plants and animals

in the Silver Burdett fifth grade science text, which was considered to be a good resource but needed to be supported by other materials to meet the standards for an integrated unit. The chapter is a general one on living communities, interrelationships and ecological concerns. The specific topic of rain forests was chosen because it provided many avenues for integrating language arts skills and because of its relevance to current issues, the interest the children have in the jungle, and the availability of excellent selections of children's literature to support the topic.

Conducting an Instructional Analysis

Dick and Carey define instructional analysis as breaking the goals down into the subordinate skills that must be learned. What exactly will the student have to do in order to achieve the larger goal? Skills are organized in some way that indicates their learning domains and order of learning. This process results in an analysis chart illustrating these skills and showing the relationships between them. It is from this analysis that lessons are planned and a sequence of activities for the unit designed.

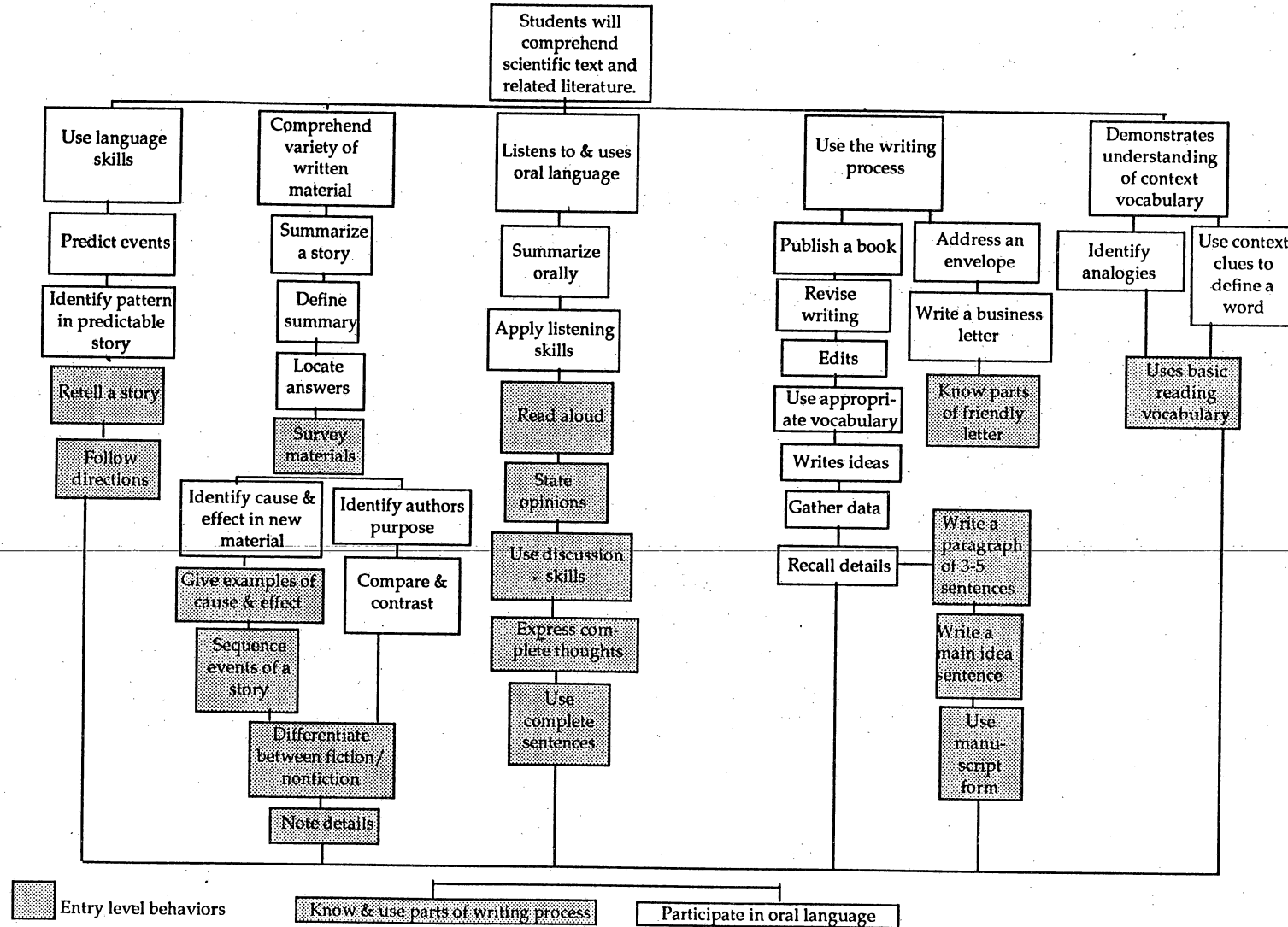
For this unit model, an instructional analysis of the goals stated previously was performed. Consistent with the elements of quality in integrated instruction, this step assured that lessons are not taught in isolation from either prior knowledge or other concepts or ideas taught within the unit. The chart which resulted from this analysis is given in Figure 2.

Identifying the subskills was done by carefully examining the main goal and then matching the skills matrix in the district frameworks, reviewing the content of state frameworks, with the subskills that were identified.

To illustrate, after stating the language arts goal "students will demonstrate understanding of scientific text and related literature by reading, discussing, speaking, listening and writing" the skills involved in the cognitive goal understand were identified. Reading comprehension is a vast area, consisting of many subskills and processes. It was necessary to identify which of these varied skills were appropriate for this unit. This was done by breaking the goals into subgoals and the subgoals into more specific skills.

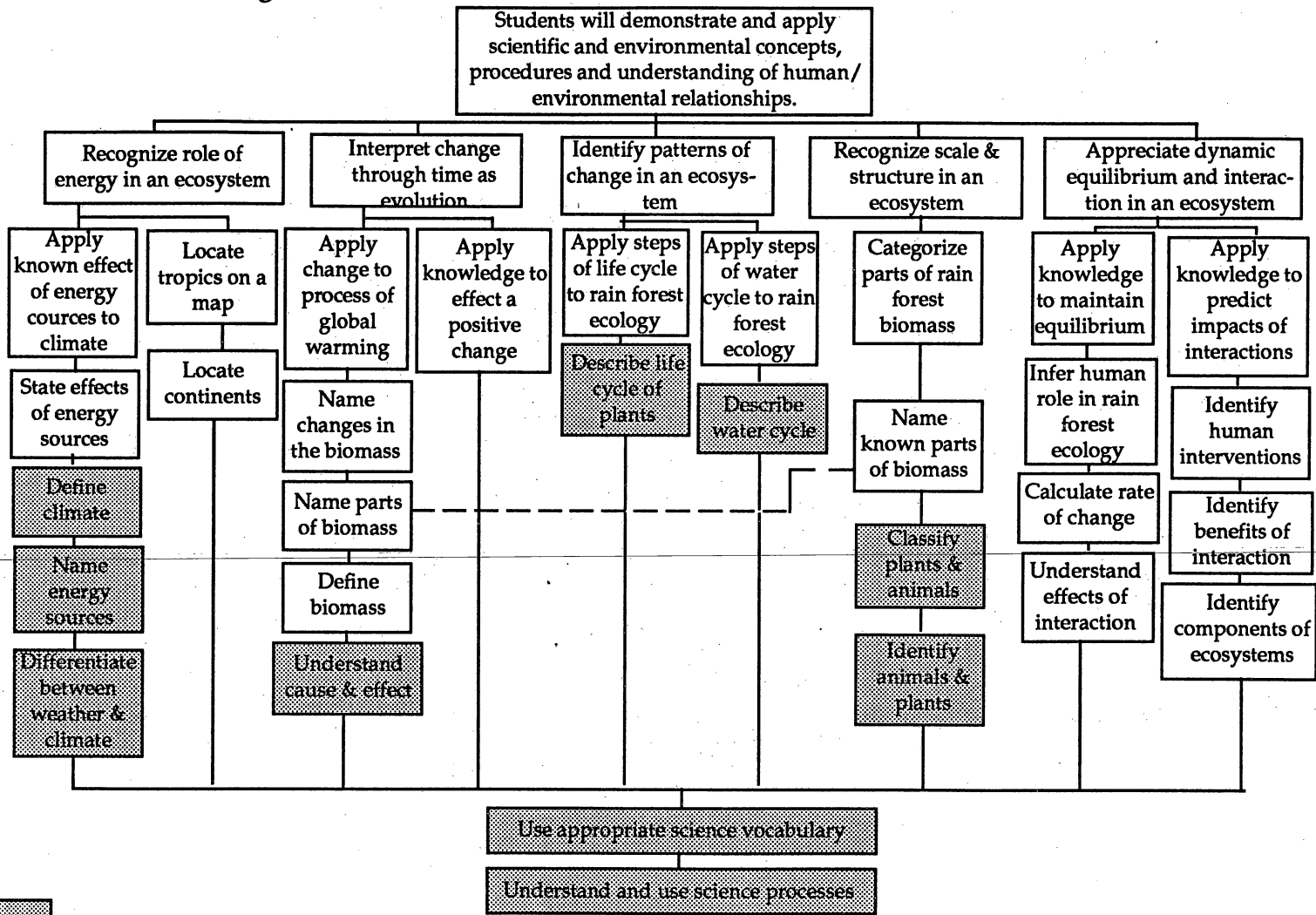
Ultimately, five major subgoals of reading comprehension were identified, namely (1) Use language skills, (2) Comprehend a variety of

Figure 2a. INSTRUCTIONAL ANALYSIS CHARTS *



* Skills based on MVUSD Language Arts Framework

Figure 2b. INSTRUCTIONAL ANALYSIS CHARTS *



* Skills based on MVUSD Science Framework

written material, (3) Listen to and use oral language, (4) Use the writing process, and (5) Demonstrate understanding of vocabulary in context.

Within each of those five subgoals, very specific skills were

determined. For instance, for the subgoal "Use the writing process,"

the following skills were identified:

Goal: Uses writing process

Subgoal 1: Writes a book.

Skills: notes details
recalls details
gather data
use appropriate vocabulary
participates in oral language
writes ideas
edits ideas
revises writing
publishes writing

Learning objectives were subsequently written for each of these skills, and they were arranged in a logical sequence for lesson planning.

To facilitate the organization of the subgoals and subskills identified, the goals analysis chart in Figure 2 was developed. This chart provided a clear graphic representation of the subordinate skills needed to accomplish the integration. Interrelated skills were identified so they could be consolidated into single lessons or activities. Sequential lesson plans were developed from the chart.

While the instructional design chart was being created, a matrix for the skills and lessons to be developed was also being designed. This made it possible to see which goal areas were being addressed in which lessons (see Figure 3). It provided a quick reference to check balance in lessons, e.g. was one goal being addressed more than others or were there inadequate lessons planned for all goals?

The chart in Figure 2 illustrates the result of doing an instructional analysis on the cognitive goals selected for this unit. This is a hierarchical chart, with skills listed in the levels in which they should be mastered. This chart also enabled the teacher to indicate entry level behaviors that students were expected to possess prior to instruction of the model.

Identifying Entry Behaviors

Prior to introducing new material it is necessary to identify specific skills and characteristics students are bringing into the new unit lesson. This process involves close examination of district frameworks for the prior grade. This enables the teacher to identify what goals were taught previously and to make assumptions about

Figure 3. MATRIX OF GOALS AND LESSONS

Lesson Title	Language				Science						
	Use language skills	Comprehend a variety of written material	Listen to and use oral language	Use the writing process	Demonstrate understanding of context vocabulary	Recognize role of energy in the ecosystem	Interpret change through time as evolution	Identify patterns of change in an ecosystem	Recognize ecosystems as a hierarchy	Appreciate dynamic equilibrium in an ecosystem	Understand interactions in an ecosystem
Concept Attainment	•		•								
Maps of the rain forest		•				•			•		
Levels of the rain forest			•						•		•
Rainforest Secrets	•	•			•	•	•		•	•	•
Panther Dream visual recall	•		•		•		•				•
Rain forest mural *		•			•				•		•
Identify author's purpose	•	•	•								
Daily writing activities	•			•			•				•
Rain Forest in a Jar	•		•			•	•	•	•	•	•
Water Cycle				•		•	•	•	•	•	•
Detail sheets	•	•		•	•		•		•	•	•
Important Book	•	•	•	•	•	•	•		•	•	•
A Story A Story	•				•						
Predicting outcomes	•	•	•								
Rain forest collage *											
Rain forest songs *											
Rain forest choral reading *											
Wings and Webs	•		•	•	•					•	•

* Lessons are from affective domain and not included on instructional analysis chart

what knowledge and skills the student will possess when entering the new unit.

It is important to note that although the frameworks and the textbook provide information about what should have been taught, in reality this is not always the case. Teachers' own formal or informal evaluation of the students' entry level behaviors often serves as a more accurate indicator of their readiness for instruction. Teachers may also choose to administer pretests or conduct needs assessments in order to learn exactly which skills student possess or do not possess prior to beginning instructional design and actual teaching.

The students involved in this project were sixty-four fifth graders at a Moreno Valley elementary school. Approximately a fourth of the students did not attend the same school in third or fourth grade, making identification of entry level behaviors from previous grades challenging. Students at this school come from a wide variety of other locations, resulting in a great diversity of entry level characteristics for all instruction, as well as this unit. The teachers' informal evaluation, based on prior instruction during this school year, was used for identifying those characteristics for this unit.

The indicators that were taken into consideration for this unit were students' past performance on other science and language arts units, observation of student behavior, and consultation with the fourth grade teachers regarding which skills had been emphasized in the previous year. Based on these, several characteristics emerged.

First, this group of students appeared to be highly kinesthetic and auditory learners. They learn well, and behave well, in environments where they hear what they are to do, participate in guided instruction, and then work independently. This is qualified by the fact that this particular group of children does not follow directions, either oral or written, well, and the guided instruction portion of lessons would have to be longer and more detailed than normal. Because this has proven to be the best learning environment for them, the new unit would contain a large number of active, manipulative activities, a strong emphasis on oral language, and great attention to giving and following instructions.

Second, the students have a low average reading level. It was not reasonable to expect them to read large quantities of scientific text or long literature selections and comprehend and enjoy them. There

would need to be teaching strategies that will enable students to experience success with the material being presented.

Third, the students have all developed competency in the use of basic science processes in past science units, and the basic writing process in language arts. They were expected to be able to use those in the new unit.

Additional entry level behaviors and characteristics were identified by reviewing the fourth grade science and language arts texts to verify which skills should have been taught prior to entering fifth grade. However, most importantly, the skills taught in the first three chapters of the science unit and the language arts lessons taught prior to this unit were reviewed and examined to establish the basis upon which this unit would be taught. Consistent with the learning theories discussed in the first chapters, instruction in this unit was designed to build upon and use information and knowledge the students had previously acquired. The following specific entry level characteristics were then identified:

Unit Model Entry Level Behaviors

Language Arts

1. Students can write a paragraph of three to five sentences

using a main idea, details and conclusion.

2. Students can identify the main parts of a friendly letter.
3. Students can differentiate between fiction and nonfiction.
4. Students understand the meaning of context clues and can write a definition of a new word using context.
5. Students understand the meaning of a summary and can identify a summary of a story.
6. Students know and understand the eight steps of the writing process.
7. Students can identify the pattern in a predictable story.
8. Students are familiar with and can give examples for the terms cause and effect.

Science

1. Students understand the general meaning of the science processes and can identify which process was used in certain activities.
2. Students understand the process of plant respiration.
3. Students can define the terms predator, prey, habitat, ecosystem, ecology, environment, culture.
4. Students can describe the difference between weather and

climate.

5. Students can classify plants and animals by characteristics and habitat.

Once these entry level characteristics were identified, it was then possible to begin writing specific performance objectives for the new lessons that would be introduced in the new unit.

Writing Performance Objectives

Based on the skills which are identified in the instructional analysis, the teacher writes specific learning objectives for the lessons. These statements identify the skills to be learned, the conditions under which they are performed, and the criteria for successful performance.

After the instructional design chart and matrix were developed and lesson sequence decided, performance objectives were written for the lessons in this model unit. A specific learning outcome was identified for each skill in the chart. Each learning outcome was stated in terms of the skill being learned, the conditions under which the skill would be used, and the criteria for success, as specified in the Dick and Carey model (1985). These performance objectives were later

written into the actual lesson plans and used to decide on instructional strategies.

For example, one of the subordinate skills chosen for this unit was that students be able to identify the author's purpose in writing a piece of literature. Written as a specific learning outcome, it is phrased, "Given a fiction or nonfiction literature selection either orally or read to themselves, students will be able to identify with 90% accuracy whether the author's purpose in writing was to amuse, inform, entertain or advertise." Written in this manner it was possible to not only identify exactly what the student was supposed to do, but also to write a test item to evaluate it.

The performance objectives for the skills in this unit plan are found in each lesson plan (see Appendix A).

Developing Criterion-Referenced Test Items

After identifying the performance objectives, the teacher develops assessment items which measure the students' ability to successfully perform the behaviors identified in the learning objectives. An attempt is made to choose authentic assessment tools that meet the needs and learning styles of the teacher and students. It

is possible to design a variety of assessment tools, and careful thought is given to an appropriate means of testing. Authentic assessment can take many forms.

Once performance objectives were written for the unit, criterion-referenced test items were developed to assess the students' success in achieving the goals. An attempt was made to create a variety of test items so that students of all learning styles would be able to demonstrate success in several ways. Entry behavior evaluation had been done prior to the development of the unit and students had demonstrated what was felt to be adequate mastery of those skills. The only pretest given was to have the students write an essay telling everything they knew about the rain forest (see Figure 4).

Consultation with other teachers indicated that the students had not been exposed to this information before. Some embedded assessment items were designed to be included in the practice activities. For instance, identifying author's purpose was an ongoing activity throughout the unit, taking place each time a new book or selection was read. While there was an item on the unit test, the ongoing evaluation during the unit was also an accurate indicator of student success with that skill. At the beginning, students tended to

Figure 4. Sample of pretest.

I know a little bit about the plants, animals, people and problems of the rain forest. I know that there are very few of the kinds of plants and animals that are there. The people there are ~~write~~ help the plants and animals. They are also there to put out fires. That's about all I know about plants, animals and people and fires at the rain forest.

just guess the purpose after hearing or reading a story. By the end, they were stating their theory and giving reasons why they thought the author had that particular purpose. The answers on the unit test item only reinforced the results of the ongoing evaluation during the unit instruction. However, most test items were designed to be administered as a posttest at the end of the unit. The unit test consisted of several multiple choice questions, an exercise on placing vocabulary in context, a short essay and a drawing, all taken directly from the specific learning outcomes.

Developing an Instructional Strategy

In this phase of the instructional design process, instructional strategies are developed or selected. Emphasis is given to the criteria for quality and elements of integrated instruction, as well as content of material and learner characteristics. The types of instructional materials, including audiovisual or technological materials, are selected. Also included are practice, feedback and formative evaluation.

Prior to developing the preinstructional strategies for the integrated unit, a calendar was designed to provide a framework for

the unit, and to allow it to be designed around the other school week activities. Regular classroom obligations were placed on the calendar first, and the unit designed to coordinate with them. The calendar was posted to allow students to see what lessons were coming up. It was then decided that the unit would be divided into three parts--scale and structure of the rain forest, occupants of the rain forest, and environmental concerns of the rain forest. Lessons and activities were assigned to each of the three areas, and sequenced to build upon and to connect with each other. A curriculum "map" evolved out of this step: a diagram, correlated to the calendar, that showed which objectives would be addressed. This also was posted for student use.

As part of the instructional strategy, students were also reviewed on past lessons from the science text and reviewed on vocabulary and concepts. This informed students of what they needed to know to begin the new unit.

Planning of sequence, size and content of each lesson was also done and was reflected in the calendar and curriculum map.

The next step was to develop and select the instructional materials. During the instructional design, test item and instructional strategy steps, ideas for instructional materials, media, methods and

activities were listed. The design of instructional materials was greatly facilitated by this list.

Teaching strategies were also chosen with the entry level characteristics of the students in mind. Lessons that involved total class participation, cooperative learning, language experience, manipulatives, music and art were selected because of the students' past success with those types of lessons. A large effort was made to vary the types of lessons to increase motivation and student interest.

For this unit, the selection of instructional strategies also considered the criteria for successful integration of science and language arts. Consideration was given to developing an instructional unit that contained a sense of wholeness and unity and was not a series of isolated lessons loosely organized around a theme. The topic of the rain forest was chosen because it was personally meaningful to the students, both in terms of relevance to current issues and to their interest level. Lessons were designed to be educationally significant as well as motivating and fun. Finally, the unit was designed to meet definite goals in both curricular areas.

Integration was achieved by designing lessons that used skills, ideas and concepts from both subject areas to support, introduce, teach,

expand, enrich or reinforce the main objective in each lesson. Language arts skills were used to record scientific data and communicate scientific findings. Science concepts and processes became the topics for literature, as well as written and oral language exercises, reinforcing both the language skills and the scientific knowledge and lending definite purpose to the children's reading, writing and speaking. Objectives were written for each lesson that could be best be reached by a combination of science and language arts activities. For example, writing their own book about the rain forest required them to develop a knowledge base. This involved reading and listening to literature selections, reacting to what they read and heard both orally and in writing, conducting scientific investigations to demonstrate or explain what they had read, recording the results of those investigations in writing or discussing them in a group, synthesizing what they had learned, recalling details, and using the writing process to write an essay on the rain forest that included both scientific information and learnings as well as good written language. The culmination of this integration was the publication of their own book.

Developing and Selecting Instruction

Based on the strategies selected, the next phase of the instructional design process involves the development of actual instructional tools for the unit. It may include the choice or creation of instructional materials, tests, and teacher's guides. Some of the materials may be original and some may be selected from texts or commercially prepared publications. This will be decided based on the relevance of the materials to the learning objectives.

The materials chosen for the unit were varied, including the science text, children's literature, information solicited from worldwide organizations, commercial teaching materials, audiovisual resources and teacher-created materials.

The science text was used as a resource for basic scientific information, primarily in teaching the introductory units before this one. The student's edition of the language arts text was not used at all since none of the selections related to the topic. However, the teacher's edition was used extensively in identifying goals and specific learning outcomes.

Children's literature formed the bulk of the material used for instruction. The current public interest in the rain forest has resulted

in a large number of books on the topic, both fiction and nonfiction, written specifically for children. An annotated bibliography of these is included in Appendix B. Some of the books were purchased by this teacher, but many were available through the public library. One book, Rain Forest Secrets, was available very inexpensively through the Scholastic, Inc. book clubs and two class sets were purchased so that every student had one book in common. In all, approximately thirty different books were available to the students during the unit.

Commercially prepared thematic units on the rain forest, ecology and environment were also examined. Many excellent lessons and activities were contained in these, and time was spent selecting which of them could be used to meet the selected goals of the units. These are also listed in the annotated bibliography.

Some of the most valuable instructional materials came from worldwide environmental organizations with educational programs about the rain forest, such as World Wildlife Fund and Rainforest Alliance. A database (see Appendix C) was created listing organizations that might have classroom materials, then letters were sent out requesting whatever might be available. Many materials were free, some had a small to moderate cost. These requests resulted in the

acquisition of maps, posters, videotapes, student activity sheets, and a wealth of background information for the teacher.

There were few audiovisual materials available, most of them from the organizations mentioned earlier. The videotapes used provided primarily basic information about the rain forest environment. The children responded well to the films, but they were not critical to the instructional materials. Some care had to be exercised as many of the more scientific videos, such as National Geographic, contained quite a bit of nudity. Careful consideration had to be given as to whether or not their use was appropriate in an elementary classroom.

After examining and selecting existing resources, the teacher designed materials to complete the package of instructional tools. When existing materials were not suitable for use in meeting a goal, a new material was developed. These new additions to the unit were frequently the most valuable in that they were written in exact specifications to the learning outcomes. Ideally, the entire unit would be teacher developed. However, in reality, few classroom teachers have time for this and must rely on commercial materials or the text for at least part of the instruction. Careful selection of these materials

based on the learning outcomes resulted in activities that supported the goals.

Practice activities were planned into each lesson, with opportunities for a variety of types of feedback--peer, parent and teacher. The combination of testing techniques decided upon in the previous step was examined and the unit test was written.

Once the instructional objectives, strategies and materials were identified and selected, the unit began to take shape and individual lesson plans were developed.

Developing the lessons for this unit included several steps, although most were done concurrently with others. Taking the performance objectives and test items, each lesson was examined and discussed to choose the best method of presentation. Available materials were evaluated and chosen, and changed if necessary.

The result of the development of instructional materials was a two-week lesson plan and a student activity booklet. The booklet was designed to be completed for display at the school open house as well as an assessment device. Most activities involved some work in the booklet, but there were also lessons that were done together as a class.

The unit model, consisting of individual lesson plans and the contents of the student booklet, are found in Appendix A.

Ultimately the unit consisted of a series of approximately twenty lessons. Some of these were single session activities, but for the most part they were ongoing lessons that built upon and supported each other. For instance, the science investigations of creating a miniature rain forest and a model of the water cycle were physical demonstrations of what the students had read about the role of climate in the rain forest. Each lesson was designed to supplement or reinforce prior objectives as well as introduce new material.

Designing and Conducting the Formative Evaluation

After the draft of the instruction is completed, formative evaluation is conducted. For this project, a field testing was done. Formative evaluation provides useful information for the designer to use in revising the instruction.

The formative evaluation for this unit model was done with a field test in the Spring of 1992. Two fifth-grade classes of thirty-two students each were involved in the field test. Both classes were taught the same lessons using basically the same time frame, but

presentations varied because of differences in teaching styles.

During instruction it was evident in almost all cases that the students did possess the entry behaviors identified earlier. The only exceptions were students who had been identified as learning disabled and mainstreamed students who were not necessarily functioning at the same level as the majority of the class. However, these students did possess the entry level behaviors for some of the activities, if not all, and were able to participate successfully in the majority of the unit.

The instructional unit itself was successful in many ways. Students were enthusiastic and involved in all activities, particularly those involving hands-on science and art. Behavior problems were minimal, and most students completed all activities that were assigned. Students responded positively to, and were motivated to begin, each new activity. At the school Open House during the second week the students showed great pride in displaying their books and their mural. During the school day, they talked about it to everyone they encountered, using vocabulary words and concepts learned, expressing themselves orally. There was a steady stream of visitors coming by the classroom to see their experiments, activities and

creations. This was the most encouraging success of the unit, but results of formative evaluation were also positive.

Student writing reflected understanding of the basic environmental concepts that had been taught, and they used the vocabulary correctly in context in their essays. They could identify the critical issues of rain forest ecology with little difficulty, and became familiar with the names, characteristics, habitat and behavior of many of the rain forest inhabitants. Many students voluntarily brought in articles from the newspaper or reported on related television shows they had watched during the unit.

The results of the posttest (see Appendix A) were positive--the class average was 80%, increasing to 85% when the scores for students on modified programs (limited English, learning disabled, mainstreamed) were deleted. Students displayed a great deal of pride in their test scores, hanging them on bulletin boards in the classroom and the office. The only areas the students consistently had trouble with on the test were the essay questions, which have posed difficulty for them in all subjects all year. Most students included the basic vocabulary and concepts in the answers, but many times the answers were not phrased clearly. In teaching the unit again it would be

beneficial to emphasize writing clear answers to questions more heavily during the unit.

During the field test, it was discovered that many activities took longer than expected, and by the end of the first week the actual pace of the unit was approximately a day behind the plans. This is not unusual in executing a large instructional unit and, in this case, was due primarily to students demonstrating enthusiasm for certain portions of the instruction and the teachers making the decision to allow extra time for expansion of that activity. This was not considered a failing, but rather a matter of logistics that could be remedied during the revision of the unit.

Revising Instruction

The final phase in the instructional design process is revising the instruction, based on the results of the formative evaluation. It may be necessary to reexamine the learning objectives, the entry characteristics, or the instructional analysis as well as the instruction itself. Instructional strategies may need to be changed and adjusted to better meet the needs of the learners. All of this will result in revision of the instruction in order to make it a better teaching tool.

The formative evaluation showed that this model had many strengths. Both teachers felt that the most positive aspect of the entire unit was the high level of student interest. Students came into class each day asking what activity they would be doing, inquiring what books would be read, and examining the scientific investigations going on around the room. The wall mural was the high point for most students. They maintained interest and enthusiasm in working on it throughout the unit. In doing it they made concrete representations of the structure of the rain forest itself and the plants and animals that live in it, reinforcing the science concepts they learned.

Another strength of the unit was the use of literature. Students chose to read the literature selections during silent reading time in class. They all enjoyed having their own copy of one book so the investment in a class set was worthwhile. Even the process of gathering information for their research sheets, usually a chore, was facilitated by their increased reading of the books.

Students demonstrated achievement of science and language arts goals and a positive attitude by producing a book of their own about the rain forest. They were especially pleased to show them to parents at Open House, and very proud when they were asked to read

them to the kindergarteners. This step contributed not only to development of writing skills and reinforcement of scientific knowledge, but to the enhancement of the children's self-esteem.

Overall, the unit was a fruitful and pleasurable experience for both teachers and students. Of particular importance was the fact that many students commented they were not worried about taking the test because they "knew the stuff." This is a drastic change from attitudes towards other testing. Although the acquisition of cognitive and affective goals and the growth in intellectual skills were evident and gratifying, it was the student enthusiasm that made this unit the success it was. Before starting the unit the teachers of both classes in the field test felt the students would like it, but the children's response was far beyond what was expected. It is gratifying that the model provided an instructional unit that was both educationally successful and also contributed to high morale, self-esteem and pride in students and teachers alike.

As the unit progressed both teachers took notes on areas they felt were weak or needed revision. When comparing notes, it was found that most of the suggestions were in reference to mechanics, not content.

One weakness of the unit was its length--time approximation needs to be at least twice as long as originally allotted in order to teach the material thoroughly. Some lessons had to be shortened or left out because of time constraints. It was also felt that the scientific information on plants and animals should have also been integrated, rather than taught separately. Students had forgotten some of the material by the time the rain forest unit was taught, necessitating review that had not been planned. Some of the lessons were more successful in one class than the other, however that was not felt to be a weakness of the unit. Rather, it was the result of the combination of different teaching styles and inexperience with the lessons themselves on the part of the teachers. The revision process would enable them to adjust lessons accordingly.

At the end of the unit the teachers compiled a list of revisions they felt should be done in order to improve the unit.

Recommendations for teaching the unit in the future were made.

- 1.) A few of the worksheets needed minor revisions, particularly teacher-made worksheets being used for the first time. The revisions mostly involved the format.
- 2.) More audiovisual materials are recommended. This was based

on several students commenting, "I wish I knew what the rain forest really looked like!" An effort would be made to locate additional and appropriate audiovisual materials when the unit is taught again.

- 3.) The unit would be lengthened to at least four weeks, allowing time for more use of literature and the introduction of additional science concepts.
- 4.) The main revision would be the integration of skills and concepts covered in the first three chapters of the science book. These lessons could be taught as a component of the unit on the rain forest, rather than as introductory material.
- 5.) An effort would be made to obtain more class sets of books for student use so that students could be encouraged to read entire works.
- 6.) Some kind of performing arts activities will be added to enhance the unit. The students reacted positively to the other fine arts activities that were included; dramatics would add additional depth.
- 7.) Integration of additional curriculum areas would be attempted-- particularly math and social sciences. The occasional lessons in

other subjects that related to the rain forest unit and were included in the unit were well-received by the children and demonstrated for them the interrelationship of their learning. The response was more than enough to encourage the teachers to integrate the other subjects more fully.

The unit was generally successful and a positive experience for both students and teachers. Revisions would fine-tune an already successful project.

Limitations

There are several limitations to this project which should be considered during its use.

- 1.) The lesson plans, matrix and instructional design chart illustrate only the lessons for the cognitive goal, although the actual unit included an affective goal and activities.
- 2.) The evaluation of the final product was limited. There was only one opportunity to field test the success of the unit model and make revisions prior to publication.
- 3.) The audience for the unit model is limited to fifth grade students using the identified texts.
- 4.) The availability of the sample model is limited to schools that utilize the Silver Burdett Science series and the Harcourt Brace Jovanovich Reading Program since the lessons are based on the core program from those texts.

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Appendix A

Unit Model

For an Integrated Language Arts and Science Unit

on

The Vanishing Rain Forest

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A NOTE TO TEACHERS

The development of this unit was encouraged by the recent movement in education towards literature-based and integrated curriculum and the impending implementation of the new California State Science Framework. It was designed for teachers who have limited resources in terms of class sets of literature selections or basal readers that do not supplement the science instruction. The unit is a model, intended to be used as an example when designing additional integrated units. Although integration is mandated by the state, teachers have been given few materials with which to accomplish the actual implementation. This model is intended to provide a framework for use in actually implementing an integrated curriculum in the classroom. It can be used as a model for integration of any subject areas.

An integrated curriculum has several key elements. The first element of an integrated curriculum is that it emphasizes the connection between all learning and works for a broader understanding of all subject matter (Perkins, 1991). Second, an integrated curriculum is based on learning outcomes, which frequently

cross over curricular lines and reflect continuity and relevance to instruction in several content areas (Brandt, 1991). Third, an integrated curriculum integrates learning with the students' personal system of meanings, giving relevance to the world around them (Beane, 1991).

In addition to elements which define an integrated curriculum, there are also criteria which determine its quality. The first criterion is that it is taught with wholeness and unity (Beane, 1991). Second, the curriculum must be personally meaningful to the students, teachers and administrators who are involved with it (Beane, 1991). Third, the content must be educationally significant and contain solid subject matter (Brophy, 1991). The last element is that the instruction will foster learning towards specific goals in each subject matter, not simply use one subject as a vehicle for teaching another (Brophy, 1991).

Berg (1988) provides a concise definition of integrated curriculum.

In a generic sense it is any curriculum development effort in which two or more previously separate subjects are combined. It also means providing for learning situations in the classroom in which aspects of different content areas are developed together for real purposes and

real audiences. It has to do with making coherent wholes out of parts.

This definition fits the key elements and quality criteria already stated, and reminds the teacher that the subjects to be integrated are *combined*, not taught side by side. There must be a meshing of goals, learning outcomes, activities and lessons in order for true integration to take place.

When using this model teachers will have a graphic representation of their instructional unit and will be able to verify that their units address goals from all the areas being integrated. They will choose topics that are relevant to the students and encourage enthusiasm and motivation to learn. The unit that is developed will be a cohesive whole, educationally sound and exciting for students to experience.

INTRODUCTION

Purpose

This unit model demonstrates the instructional design procedures to create an integrated language arts and science unit on the rain forest for a fifth grade class.

The goal of the project was to design an integrated unit of instruction in science and language arts that would meet the quality criteria for integration as well as meeting instructional goals mandated by the school district and the state.

Two primary instructional goals in the cognitive domain were identified, one for science and one for language arts. Although the goals were broken down into separate subskills during task analysis, many of the lessons incorporated activities that crossed curricular lines and worked towards successful completion of both goals. This is evident in the matrix of goals and lessons (see Figure 2). An affective goal for incorporating art and music into the unit was likewise identified, but it is not included in this model. The unit model focused mainly on the cognitive goals.

The language arts goal states that "Students will demonstrate understanding of scientific text and related literature by reading, discussing, speaking, listening and writing." This goal was met through a variety of literature-based lessons and activities.

The science goal states that "Students will demonstrate and apply knowledge of scientific and environmental concepts and an understanding of human/environmental relationships." Several literature lessons and activities and science investigations were designed to reach this goal.

Unit Description

This unit was designed and developed because of the emphasis put on integration in the district where the author teaches. The basal reader was adopted to encourage a whole language and literature-based approach to language arts, and the science and language arts frameworks mandate integration of curriculum areas, although neither was designed to be used with the other. The topic of the rain forest was chosen because it is one that fits the goals for fifth grade science instruction, because of a high student interest level, and because of its relevance to current affairs. Although the textbooks were

used minimally, the approach was literature-based and there was a strict adherence to the key elements and quality criteria of integrated instruction. This was made possible by the use of resources which were teacher-made and/or commercially available.

This project resulted in an extensive instructional unit on the rain forest designed to meet the stated cognitive goals. The unit integrated language arts, literature and science lessons. It was designed to be taught as an immersion unit, taking most of each school day for approximately four weeks. Because the entire unit incorporated both affective and cognitive domains the instruction included activities in most curricular areas, including social science, art and music. The exception were math and physical education, although there were a few activities in those areas also.

The unit was designed to be used by teachers who have access only to basic textbooks and one copy of the literature selections. Eventually, class sets of one book were purchased, but the unit could be taught without them. The lessons include activities for total class participation, cooperative learning groups and individual work. The unit was divided into three sections--structure of the rain forest, inhabitants of the rain forest, and ecological concerns for the rain

forest. Lessons build upon one another, with all lessons contributing towards the creation of a rain forest mural in the classroom.

The unit was designed to fit into a year long classroom theme on "Journeys." This particular unit was "A Journey to the Tropical Rain Forest." Students had already participated in a science unit on plants and animals, and the knowledge they gained in that unit was put to use when learning about the unique environment of the rain forest. Prior knowledge about plant and animal classifications, characteristics and behavior was used to make hypotheses and generalizations about life in the rain forest. Many language arts skills were reinforced, and new ones were introduced. The use of literature in all subject areas was an ongoing process, but an effort was made to find a wide variety of materials, particularly nonfiction.

The unit was a positive experience for both the students and the teachers who participated in the field test. Based on the success of this unit, the teachers plan to integrate further instructional units in the coming school year.

LESSON PLANS FOR THE UNIT MODEL

THE VANISHING RAIN FOREST

*When commercially prepared materials were used only the objective and the materials are listed. Procedure, evaluation and worksheets can be obtained from the publication itself. A complete listing of the publications including publisher and price is included in the bibliography.

LESSON PLAN

CONCEPT ATTAINMENT

Objective: Given positive and negative examples, students will compare examples, suggest attributes, identify further examples as positive or negative and give hypotheses as to concept of rain forest. Students will then write an accurate description of a rain forest using the positive examples.

Materials: Positive and negative examples on cards, paper and pencils.

Procedure:

Phase One

1. (Motivation) We're starting a new science unit today. We're going to play the yes/no game to see if you can figure out what we'll be studying. You'll be looking at things that are examples of what we'll be working on, and examples of things that don't belong.
2. Remind students of the rules for the game.
3. Present first two positive examples and one negative example.
4. Encourage students to make oral comparisons. Add one or two more examples.
5. Ask students to identify the next few examples as yes or no. Require explanations of why they chose that category.
6. Allow students to state their hypotheses and write them on the board.

Phase Two

1. Confirm hypothesis.
2. Ask students to give more positive examples.
3. Have students give oral definitions of a rain forest based on positive attributes.

Phase Three

1. Ask students how they figured it out.
2. Examine the hypotheses and discuss why they were or weren't correct.

Closure

Have students complete the maze worksheet and write a comparative paragraph about the rain forest and other environments based on the positive and negative examples.

Evaluation: Students' paragraphs will demonstrate a basic knowledge of the characteristics of the rain forest.

Positive Attributes

rain

trees

jaguar

army ants

hot

vines

flowers

butterflies

sloth

bulldozer

fire

medicine

Negative Attributes

dry heat

grassy

lion

bears

cool

snow

cactus

wide open sky

mountains

skateboards

sidewalks

useless

What is a tropical rain forest like?

The biome that is richest in plant and animal life is the tropical rain forest. These jungles are located in warm, humid regions near the equator. Heavy rains wash away minerals in the soil, making it poor and thin. Several types of communities exist within the tropical rain forests.

Think about facts concerning tropical rain forests. Then let your pencil walk through this word maze, going only through passages containing correct statements about tropical rain forests. You may check your work with a reference book.

START →

hot and dry arid land

wet and damp jungle floor

lush and fertile flat grasslands

exotic colorful birds

thick and dense trees loaded with vines and creepers

smoggy and densely populated

dark with crowded broadleaf plants

seals romp on floating ice

mammals swing through trees on vines

squirrels run through evergreens

cactus stand against the blue sky

hot, humid and sticky

END ↘

Science at home:
 Our tropical rain forests are endangered! Find out why. List the problems people are creating, and what you think must be done to prevent an ecological disaster.

LESSON PLAN

MAP SKILLS

Objective: Students will accurately locate the three main rain forest areas and label the continents and oceans on a map of the world.

Materials: world map
worksheet with world map reproduced
crayons
pencils

Procedure: Remind students of the concept of continents and have them name the continents from the world map. Tell them that the tropical rain forests are located on three main continents, between the Tropic of Cancer and Tropic of Capricorn. Ask students to suggest which continents that would include, then label those three continents on their worksheets. Have students create a key for their map using the appropriate colors. Ask students to name and locate the three continents again, having a buddy check for accuracy.

Evaluation: Students will have met the objective if their buddy verifies that they can locate and name the three continents.

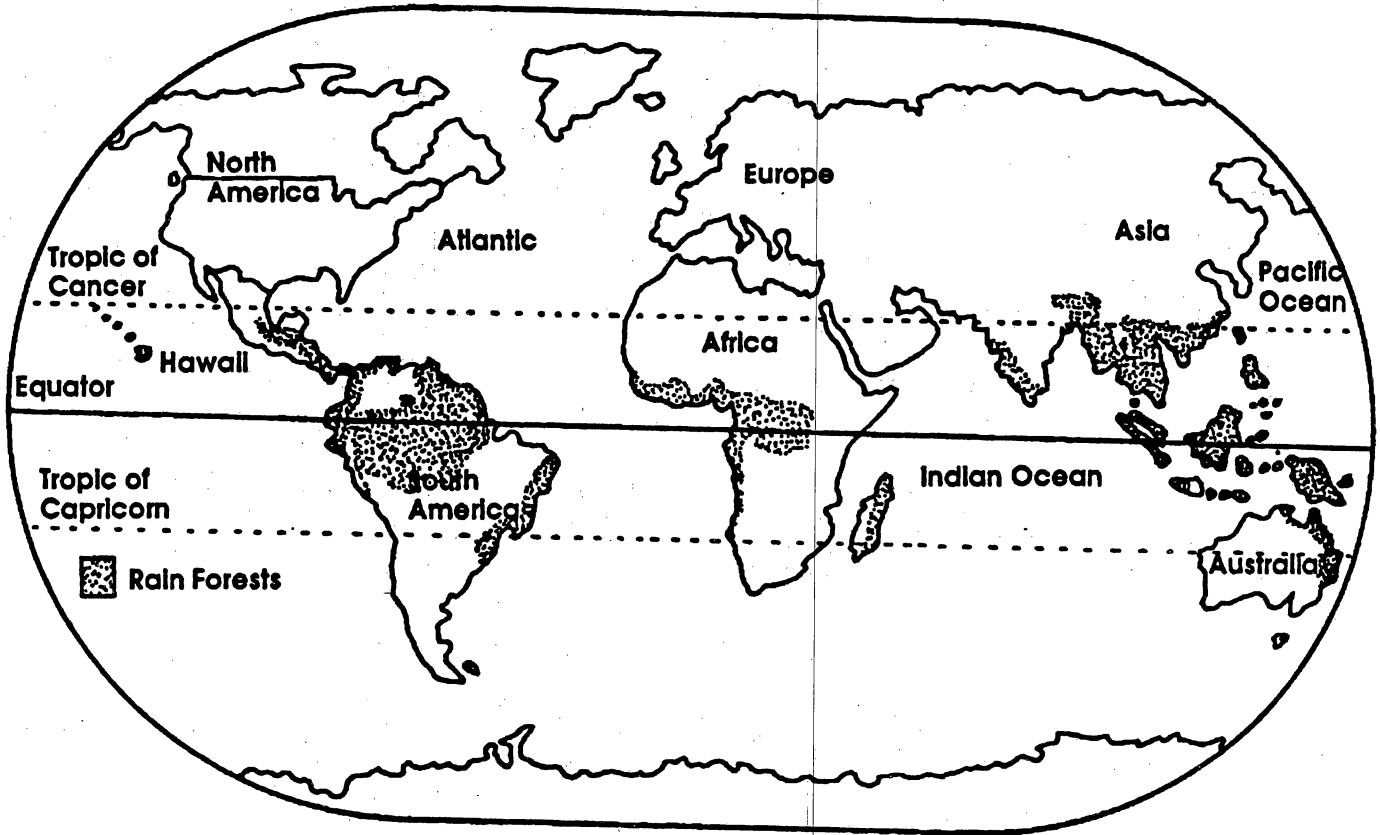
The Earth's Green Belt

Tropical rain forests cover about 5% of the world's surface. There are three main rain forest regions on three different continents. Study the map. Color it and answer the questions below.

Color the South American and Central American rain forest area light green.

Color the African rain forest (including the island of Madagascar) dark green.

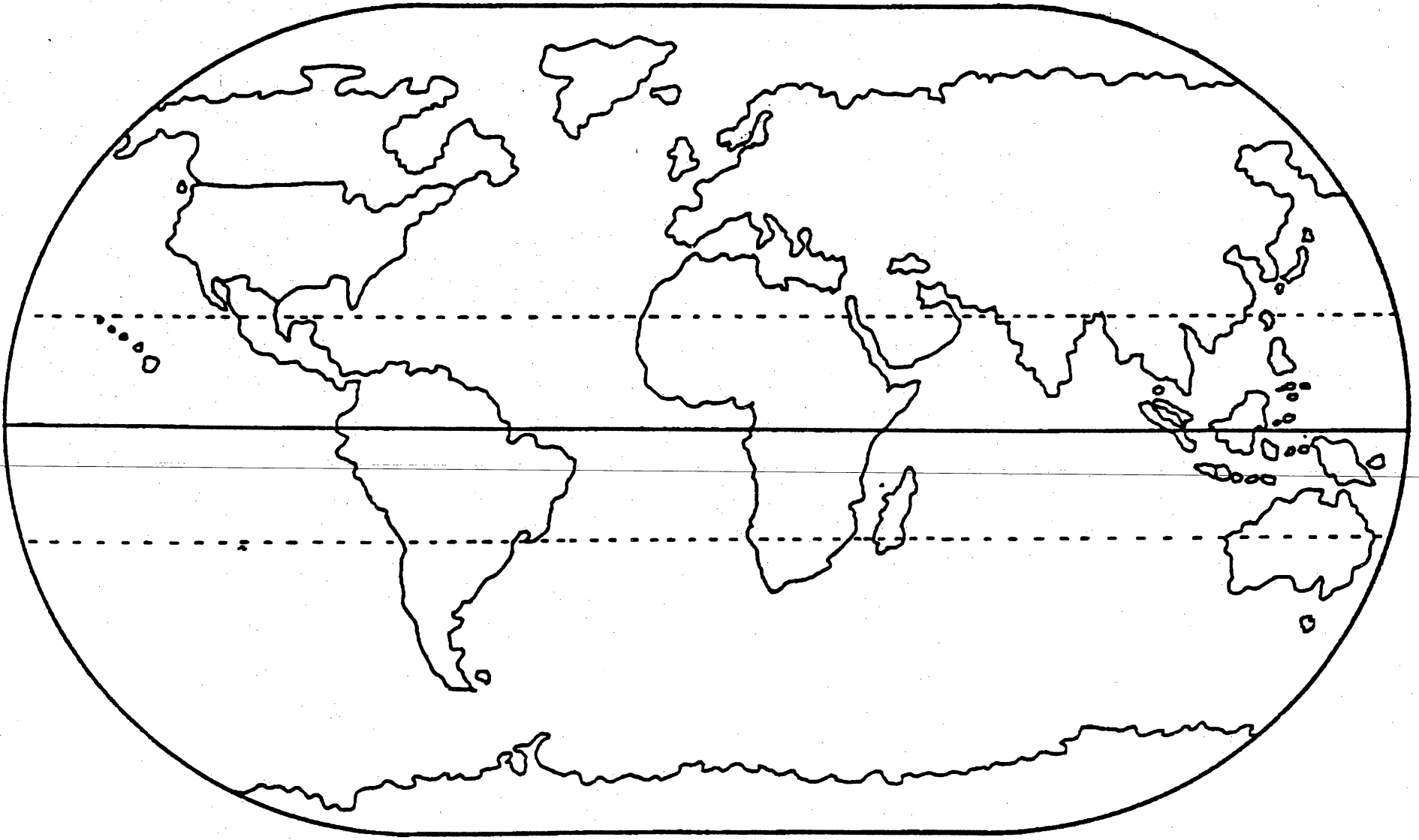
Color the Southeast Asian rain forest yellow.



1. The world's rain forests are near what imaginary line? _____
2. The world's largest rain forest is located on which continent? _____
3. Which rain forest is located mostly on islands? _____
4. Why do you think there are almost no rain forests north of the Tropic of Cancer or south of the Tropic of Capricorn? _____

The Tropics

Tropical rain forests lie chiefly near the equator. Label the following on the map below: Equator, Tropic of Cancer, Tropic of Capricorn, North America, South America, Africa, Europe, Asia, Australia, Antarctica, Pacific Ocean, Atlantic Ocean, and Indian Ocean.



Challenge: Describe the animal and plant life of a rain forest. Tell about the temperature and rainfall in a typical rainforest.

LESSON PLAN**LAYERS OF THE RAIN FOREST**

This lesson is from the commercially prepared publications Thematic Unit: Jungle and The Vanishing Rain Forest.

Objective: Students will identify the four layers of the rain forest by making a drawing and labelling each layer.

Materials: worksheets from the resource book
pictures from a variety of books about the rain forest.

Procedure: See attached resource pages

Evaluation: Students' drawings will contain the four layers of the rain forest, labeled correctly.

Plant Life in the Layers

A rain forest is made up of four layers. The FLOOR is very dark and always wet. There is very little wind and very little change in temperature. The UNDERSTORY gets a little more sunlight and just a little less moisture. Wind and temperature changes are limited due to the thick canopy above. The UMBRELLA LAYER (or **canopy**) is almost a continuous layer of green. When seen from the air, it looks like a large, green blanket. There is sunlight above, but near darkness below. There is rain above, but a constant drip, drip, drip of moisture below. The few trees that break through the umbrella layer and escape into the sunlight, form the TOP LAYER. These trees range from 120 to 150 feet tall and have a shallow root system. They need to be propped up by an extensive above-ground root system or buttress.

The SOIL of a rain forest is thin and poor. As leaves fall and decay their nutrients are immediately needed for the dense vegetation. Roots absorb them and send them back up to feed the leaves and flowers. The recycling is fast. Fallen leaves in a rain forest do not have time to form deep soil as they do in the forests of North America. There is no winter rest period. The weather changes very little around the equator and the plants are constantly working.

Top Layer

(Penthouse) 120-150 ft. trees (full sun)

Canopy or Umbrella

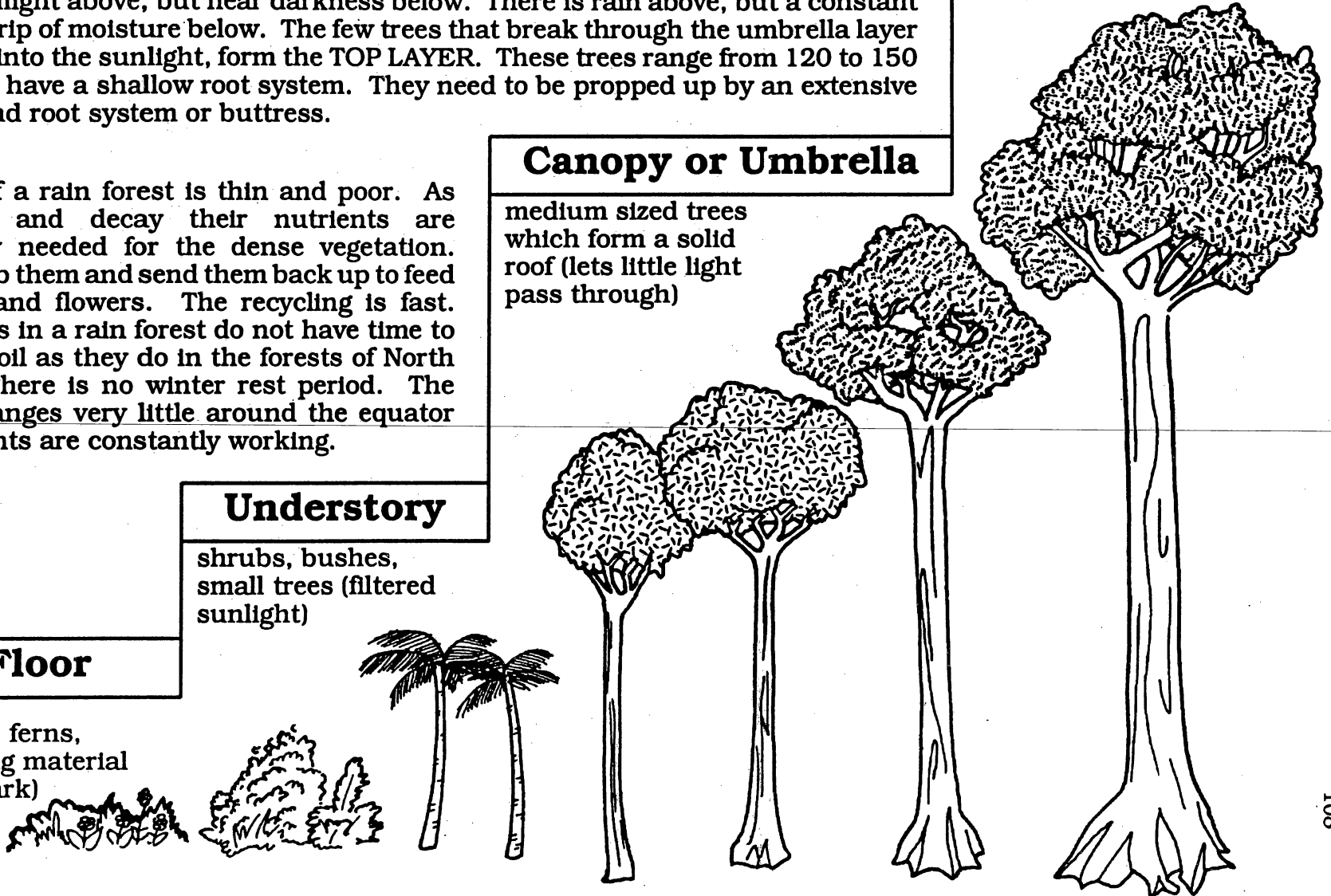
medium sized trees which form a solid roof (lets little light pass through)

Understory

shrubs, bushes, small trees (filtered sunlight)

Floor

flowers, ferns, decaying material (very dark)





UNIT 1: LAYERS OF THE RAIN FOREST

PURPOSE: To introduce students to the plants and animals that live in the rain forest from the canopy to the forest floor.

SUGGESTED AGE LEVEL: Grades 2-3 and 4-6. (Although the initial objectives and procedures are appropriate for all students, the procedures that include the food web and discussion of rain forest destruction are designed for students in Grades 4-6.)

SUGGESTED TIME: One to two class sessions.

SUGGESTED CURRICULUM AREAS: Science, geography, language arts, art, social studies.

OBJECTIVES: As a result of this activity, the students will:

- Identify and describe the four vegetation layers found in a tropical rain forest in Borneo.
- Describe several animals (physical characteristics, method of movement, and diet) and plants that are found in a rain forest in Borneo.
- Define *food chain* and give an example of a tropical rain forest food chain.
- Define *food web* and draw an example of a tropical rain forest food web.
- Suggest what might happen to the plants and animals of the rain forest if a section of the forest were disturbed.

MATERIALS: Rain forest video, background information, vegetation map, rain forests of the world map, rain forest animal and plant illustrations, black-and-white poster (large size, separate from this manual, for display; reduced size, on pp. iv-v, for copying as student handout), guided imagery, riddles (all are parts of the World Wildlife Fund education package). Additional materials needed: crayons, masking tape and thumb tacks, pieces of string or yarn (two to three feet long) for student food chains and webs, construction paper.

PROCEDURES—Grades 2-3

- Prior to activity:
 - Make copies of the animal and plant illustrations on pages 18-22.
Cut out one set of illustrations to use with the poster.
 - Present an overview of the activity—that is, tell students what they will be doing during the activity.
- Use the tropical rain forest guided imagery and the rain forest video to initiate the activity.
- Pointing to a map of the world:
 - Ask students where they live (continent, country, state, city). Point out each location as identified.
 - Ask students to describe the types of vegetation (forest, deserts, prairies, and so on) they have seen in the part of the country where they live. (Use Vegetation of the World map to identify and briefly describe types of vegetation: coniferous, deciduous, grasslands, and so forth.)
 - Ask students to define and locate the equator. Using the tropical rain forests of the world map, point out that tropical rain forests are found in a broad belt around the equator in Latin America, Asia, Africa, and Australia.
 - Ask students why these forests are called rain forests. (Explain that rain forests receive from 80 to 240 inches of rain a year. Fifty percent of this rain is estimated to be made by the plants during the process of *transpiration*.)
- Using the black-and-white poster and background information, introduce and describe the four layers of the rain forest (*emergent*, *canopy*, *understory*, and forest floor). As you talk, select one or more students to represent each layer: “emergent layer student” stands with arms up in the air, “canopy student” stands with fingers joined to form an umbrella, “understory student” kneels with arms extended to each side, “forest floor student” lies or sits on the floor. Explain that these four students represent the relative heights of the plants in the rain forest. As you describe each layer, point to the layer on the poster.
- If possible, distribute sets of plant and animal illustrations to each student. If not possible, display a set of the illustrations on the wall.
 - Read the rain forest riddles. As you complete each riddle, ask students to guess which plant or animal was described. If correct, give the student the plant or animal illustration and ask him or her to place it in its proper location on the poster.
- Introduce the concept of food chains and energy transfer by explaining to students that all organisms (including

New Words and Phrases

annuals
archipelago
biome
bromeliad
canopy
coniferous

consumer
deciduous
decomposer
emergent
epiphyte
savanna

food chain
food web
liana
nutrient
producer
equator

sedges
shrubs
temperate
transpiration
tundra
understory

humans) have a variety of different food sources. Explain that these food sources provide the energy that plants and animals need to grow.

Stress that each food item is dependent upon other elements for its production or growth. Use the following example to demonstrate the energy connections that exist between the students and the foods they eat by tracing their breakfast foods back to their sources.

STUDENT	FOOD ITEM	SOURCES	REQUIREMENTS FOR GROWTH
student	eggs	chicken	corn, soil, water, air
student	milk	cow	hay, soil, water, air
student	toast	wheat	soil, water, air
student	bacon	pig	corn, soil, water, air

- b. Emphasize that all plants and animals need a variety of foods/energy to grow. These energy connections in nature are called food chains. Explain that food chains follow the transfer of food energy from the source in plants

(*producers*) through a series of animals (*consumers*), beginning with plant eaters and continuing on to meat eaters (each organism depending on the previous one for food). Using the examples presented in background information, demonstrate how these relationships can be represented graphically.

7. a. Explain that the class will work together to write three (or more) sentences about rain forests. Working at the board, help students to write the first sentence, including five adjectives describing the rain forest. The second sentence should describe how animals are dependent on the rain forest. The last sentence should explain what is happening to the rain forest.
- b. Allow students time to color their rain forest handout (pp. iv-v) and draw pictures of some of the plants and animals they have studied.
- c. As a final activity, instruct students to fold the rain forest handout, copy their rain forest sentences inside, and take it home to share with their parents.
- d. If time is available, consider an art project encouraging students to use paint, paper, pictures, and so forth, to create the layers of the rain forest as a wall mural.

PROCEDURES—Grades 4-6

1. Follow procedures 1, 2, and 3 above.

2. Two procedures are suggested for introducing students to the plants and animals that inhabit each layer of the rain forest.

- a. Procedure 1 would follow procedures 4 and 5 for the younger students (above) using riddles (pages 23-24).
- b. Procedure 2 involves research and should be considered only if time and reference materials are available. (NOTE: Reference materials other than encyclopedias may be difficult to find. Consider making several copies of the plant and animal background information and allowing students to use them as reference sources.) If using the research approach, list the names of plants and animals provided in background information on the board.

Instruct students to:

- 1) Locate Borneo on a map.
- 2) Research a plant or animal found in a rain forest in Borneo (physical description, habitat, diet, predators, special adaptations that allow it to live in one or more layers of the forest, and, if possible, its present status: threatened, endangered). NOTE: All plants and animals mentioned in this activity are found in Borneo.
- 3) Write a brief description of the animal or plant.
- 4) Present reports to the class and place an illustration of the animal or plant in its proper location on the poster.

3. a. Following procedure 6 for the younger students (above), introduce the concept of energy relationships as represented by food chains that exist in the rain forest in Borneo. (See background information.)
- b. Using poster and illustrations, draw and discuss a few food chains (examples provided in background section) on the poster.
4. a. When satisfied with the students understanding of food chains, introduce *food webs* (the linking and intersecting of several food chains). Explain that while many food chains exist within the tropical rain forest, most organisms depend on a variety of foods for survival.
- b. Two suggestions are offered to help students understand a rain forest food web.
 - 1) Use the rain forest food web illustration provided in background information to guide you in creating a food web on the wall poster. Discuss with students.
 - 2) Build a food web. Explain that students will work together to create a food web. Using the example provided in background information, students can create a food web including the following plants and animals: durian tree (leaves and fruit), slow loris, flying squirrel, wood ants, flying draco lizard, civet, crested wood partridge, reticulated python, orangutan, *decomposers* (fungi, worms, beetles), and humans.

NOTE: It is important to talk this activity through with the students, continually stressing dependency by pointing out what each animal eats.

1. Start with the sun. Select one student to be the sun, and give him or her an illustration of the sun and the end of a piece of string. Explain that the sun is the primary source of all energy on earth.
2. Select a student to be a durian tree. As you give him or her the illustration, explain that the durian tree receives energy from the sun, is a producer (leaves and fruit), and is a source of food for many animals in the rain forest. Using the same piece of string, connect the durian to the sun.
3. Select a student to be a slow loris. As you give him or her an illustration, explain that the loris gets its energy from eating the durian fruit, which received its energy from the sun. Place a piece of string on the durian and connect it to the slow loris.
4. Make several more food chains (diagrammed in the background information) starting with the durian tree, which is the source of energy (food) for many forest animals (including flying squirrels and orangutans).
5. Look at the food chains and identify one or two animals (python and human) that are dependent on more than one food source. Connect a piece of string from the durian to an animal that eats durian fruit and then to an animal that eats the first animal.

NOTE: Slow loris, flying squirrels, and orangutans, while not a common source of food in the developed world, are part of the diet of some native rain forest peoples.

6. Finally, select a student to represent a decomposer. Explain that decomposers (members of the "garbage crew") quickly convert dead plant and animal matter into nutrients in the soil. Connect pieces of string from the durian and each animal to the decomposer.
7. Explain to the students that they are observing a food web that demonstrates how several animals in the forest are dependent on the same food source.
 - a. Demonstrate energy flow within the web. Instruct the student/python to tug on the strings. Any animal that feels the tug should raise its hand. (Which students/animals raised their

hands?) Next ask the students with hands raised to tug on their strings. Their food source (the student/durian) should feel the tug and raise his or her hand. Next ask the decomposers to tug on their strings. Any plant or animal that feels a tug should raise its hand (all hands, except the sun, should be raised).

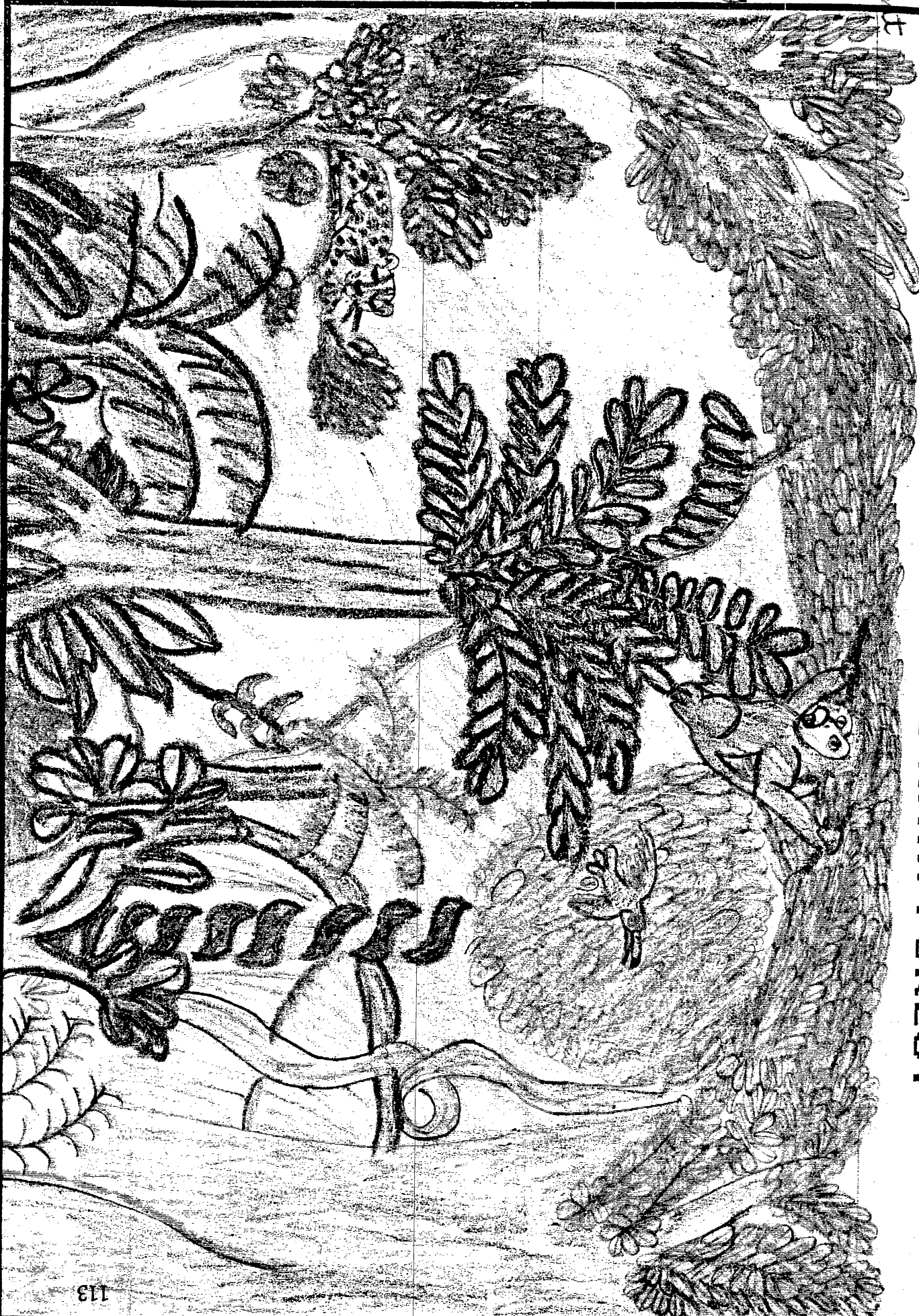
- b. Discuss the dependence of several organisms on one food source, the durian, and its dependence on its consumers.
 - 1) Ask the group to consider what would happen within the web if durian trees were eliminated from the web. Cut the strings connected to the durian and discuss the results.
 - 2) Explain that the durian is also dependent on animals—that is, animals to pollinate it, disperse its seeds, and protect it from competitors or grazers.
- c. Ask students which link in the food web all the organisms are directly related to (decomposers). What would happen if all decomposers were eliminated from the rain forest (analogous to a sanitation department strike)?
- d. As an alternative, give illustrations and background information (or time to research) to students and allow them to create their own food webs. (This may be done either as a graphic illustration on paper or by acting out new food webs.)
5. Put a piece of construction paper over a section of the poster. Place one or all of the small destruction illustrations on the construction paper. Ask students to consider what would happen to the rain forest plants and animals they just learned about if parts of the forest were disturbed (converted to pasture for cattle, cleared for firewood, for lumber, and so on).

EVALUATION

1. Were students able to name and describe the four layers of a tropical rain forest?
2. Were students able to name and describe several animals and plants that live in the tropical rain forest in Borneo?
3. Were students able to describe a rain forest food chain?
4. Were students able to describe a rain forest food web?
5. Were students able to suggest what would happen to the rain forest animals if the forest were disturbed?

THE LAYERS OF THE RAIN FOREST

THE LAYERS OF THE RAIN FOREST



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LESSON PLAN
VISUAL RECALL

Objective: Students will (1) listen to stories about the rain forest, then by creating a water color resist book cover and a mural of the rain forest, (2) accurately depict a rain forest environment.

Materials: assorted rain forest literature selections
blank books
butcher paper, construction paper, tissue paper
paint, markers, crayons, glue or paste

Procedure: Crayon Resist: Read or play an audio tape of several rain forest literature selections to the students. Tell them that they are listening to hear details about what the rain forest looks like and that they will have to draw a picture of what they hear. (This may take several days before actually starting the project.) After hearing the stories, have students create a list of things (plants, animals, people, etc.) that they will want to include in their picture. Explain how to create a crayon resist on their blank books. Emphasize making a thick layer of crayon by coloring hard. When they are finished they will paint the books with water colors to create the crayon resist.

Mural: See following lesson plan.

Evaluation: Students will have met the objective if they can create a drawing and a mural that demonstrate an understanding of the diversity of plant and animal life in the rain forest.

LESSON PLAN
RAIN FOREST MURAL

Objective: Students will construct a wall-size mural of the rain forest. They will incorporate what they have learned regarding scale and structure of rain forest levels and identification of rain forest inhabitants. They will utilize a variety of art techniques and materials to create a mural containing different textures, colors, shapes and sizes.

Materials: brown, green, red, yellow, orange butcher paper
tissue paper in a variety of greens
crepe paper in several colors
sphagnum moss (available in nursery supply stores)
thick yarn for vines
twisted paper (craft stores)
blue cellophane
scissors, paste, staples
large sheets of white paper for enlarging animals

Procedure: After teaching the lesson on layers of the rain forest, have students run pieces of yarn at the different levels across a wall or bulletin board that has been covered in black paper. This will indicate where the trees and plants of each level should stop. Discuss the different types of root systems the trees have, and then demonstrate ways to achieve different sizes and textures with the paper. Divide students into cooperative groups of three or four, and assign each

group a level for which to create a tree trunk. Staple these onto the wall as they are created. As the unit progresses students will gain more knowledge about the characteristics of the plants and animals of the rain forest and can then begin to create leaves, using templates or creating their own shapes, in different kinds of green paper. Vines can be added, using yarn or twisted paper.

After the basic trees have been constructed, flowers and other plants can be created. Again, students can use templates or patterns the teacher creates or simply be allowed to make their own. Ranger Rick's NatureScope (see bibliography) contains a pattern for a three-dimensional bromeliad that the students enjoy making.

Animals can be created by showing the students how to enlarge pictures using transparencies on an overhead projector. Many of the resources in the bibliography contain blackline pictures of plants, animals and insects.

Labels for plants and animals can be added if desired.

Evaluation: Every class will create a different kind of rain forest mural. Evaluation can be based on student enjoyment of the project, use of cooperative groups, placement of plants and animals in the appropriate layer, and identification of the different components of the rain forest that are depicted.

Prior to working on this class project, share with students several nonfiction and fiction books that depict the rain forest. Point out the wide variety of plant and animal life native to this habitat. Then create a rain forest mural on a large bulletin board or wall space in your classroom.

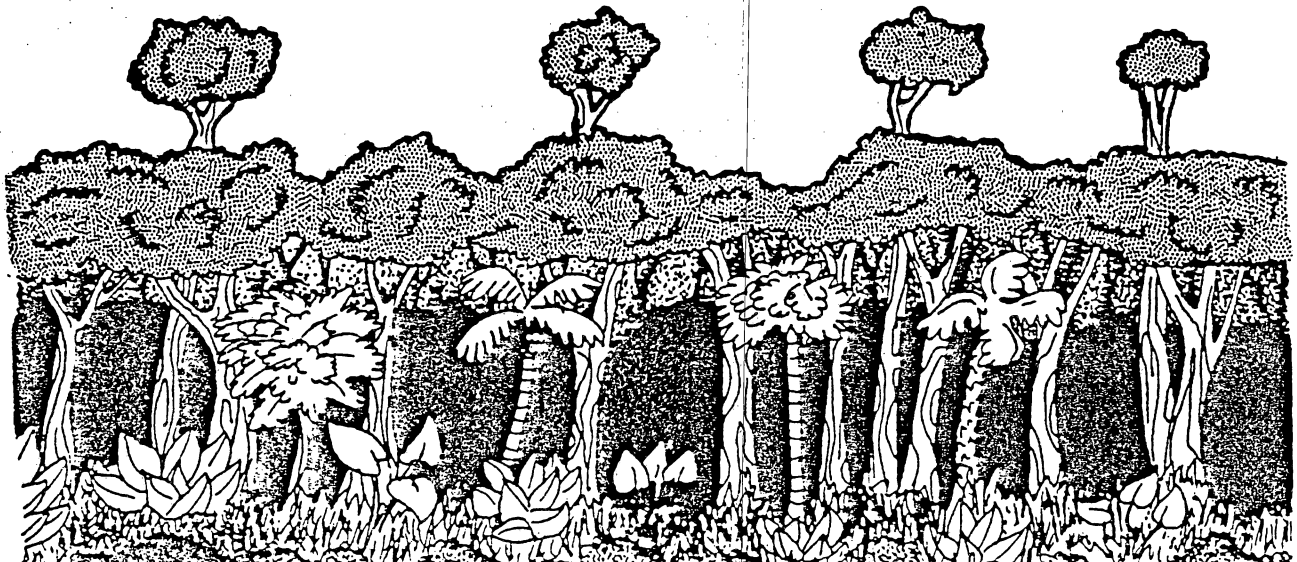
Directions:

1. Sponge or brush paint the background.
2. Make three-dimensional tree trunks by rolling brown paper and pulling the paper up from the center.
3. Use all shades and textures of green paper to design shrubs, bushes and tree foliage. As a special recycling challenge, have students find and collect materials that could be used. Suggest wrapping paper, tissue, wallpaper, magazines, cardboard, etc.
4. Use bright tropical colors to make flowers, birds, or butterflies.
5. Students will love designing native animals and hiding them deep in the forest. Make three dimensional animals by cutting and coloring two identical animal patterns, stapling them together, and stuffing them with shredded newspaper.



Layered Mural

Five main layers comprise the structure of the tropical rain forest. The emergent layer is made up of the tallest trees which house eagles and other birds of prey. Next is the canopy, so called because the leaves and branches at this level form a continuous green roof. Below the canopy lies the understory which consists of the tops of smaller trees that receive less light than the canopy. The fourth layer is the shrub layer and is comprised of shrubs and small trees. At the bottom of the forest is the herb layer which is home to ground-dwelling animals and insects. Students can be grouped to work on a specific layer. Have them research the plant and animal life at their layer so they can create a large mural (see illustration below). *Ecology* by Usborne Publishing is an excellent resource for this project. (See Bibliography, page 80, for more information.)





LESSON PLAN**RAIN FOREST SECRETS COMPREHENSION**

Objective: Students will demonstrate comprehension of a story read by completing a written story frame (summary) with 75% accuracy.

Materials: class set of Rain Forest Secrets, available from Scholastic, Inc.
story frame worksheets

Procedure: Introduce vocabulary from the story with which students might experience difficulty. Have students look through the book at the pictures and discuss what they see. Tell them they will be reading for details about the rain forest.

Assign the book to be read independently or as partners in two sessions, half the book each time. After reading the story can be discussed orally if desired, identifying important details they students discovered.

Assign the story frames to be completed individually.

Evaluation: Students will complete the story frames with a class average of at least 75% correct.

Name _____

Date _____

Rainforest Secrets Story Frame

to structure page

Another name for rain forest is _____. In the rain forest live more _____

_____. Tropical rain forests are located in the _____, near _____.

The rain forest is a good place for growing plants because _____ and there is plenty of _____. It rains a great deal in the rain forest. Much of the water is _____ but some of it is _____. The _____ flows through the largest rain forest on earth.

This rain forest provides food and a home for _____. Some of the animals that live in the rain forest are _____

The plants grow very thickly where there is _____. But inside the rain forest, where large trees _____, not so many plants can grow. The forest floor is _____.

There are more _____ than any other creature in the rain forest. Many _____ ants cut bits of leaves to to make _____ where they raise _____ to eat.

Things _____ in the heat and moisture of the rain forest. The decayed plants provide _____. Trees also use the nutrients by sending out shallow surface roots called _____ and _____. Big animals such as _____ also live on the forest floor.

More than _____ the animals on the earth live in the rain forests,
even though the rain forests only cover _____
Most of the plants and animals in the rain forest _____
_____.

There are many _____ in the rain forest. Each layer provides
a _____.
The top layer, called the _____, There are many plants
there, called _____, or air plants. These plants are a
_____ to many _____. Above the canopy
are _____, where an _____ might
live. One of the animals of the canopy is the greenish _____. They
are greenish because _____.

Name _____

Date _____

Rain Forest Secrets Story Frame 2

The _____ is the smaller layer of _____ that grows _____. Vines called _____ grow towards the _____ in the canopy. Rain forests were around in the time of the _____. So many things live in tropical rain forests because _____.

Many things people use come from the rain forest. We use _____ to make chocolate. Nuts such as _____ are also harvested in the rain forest. About one fourth of _____ come from rain forest plants.

The forest is constantly _____. In old garden clearings or where trees die, _____. But when much land is cleared, the _____. Land is being cleared for _____, or _____, or _____ or to build _____. The plants keep the _____ from washing away. Without plants, the soil washes into the rivers, filling them with _____ and killing many fish and animals that depend on the river. Once one kind of animal in the rain forest dies, the others that _____ also _____.

Destroying the rain forest can also cause global warming, called the _____. Cutting down the rain forest reduces the amount of _____. Rain forests that are destroyed may never _____.

We can use products from the rain forest without _____. Some of the products we can use without hurting the rain forest are _____ and _____.

Two other kinds of rain forest are _____

Africa and _____ in Asia. There are also _____

rain forests in cooler areas such as _____.

These are old-growth rain forests, where the _____

tower to the sky. Old-growth forests help keep _____.

If the destruction of rain forests continues, there may be _____

_____. But

many people are _____.

You can help too!

LESSON PLAN
RAIN FOREST IN A JAR

This lesson is taken from the commercially produced publication Thematic Unit: Jungle (see bibliography).

Objective: Students will predict what will happen to interior and exterior temperatures when a jar is placed over a plant. They will measure the temperatures of the air inside and outside of a jar. They will infer that the temperature of the rain forest is higher than the temperature outside the rain forest and suggest reasons why that is so.

Materials: lesson plan from the resource book
quart jars
small plants or cuttings in small cups of water
small thermometers--two per group
worksheet

Procedure: See attached resource pages.

Evaluation: Students will write a reasonable prediction, test it, make a generalization about the results, and apply the generalization to the rain forest environment.

Rain Forest Science Experiment

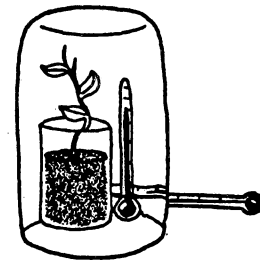
Materials: plant cutting such as creeping Charlie, spider plant, philodendron; glass of water; large, clear jar big enough to fit over the glass; two thermometers.

Directions:

1. Put the cutting in the glass of water and allow it to root. Make a chart of the daily growth of the root system. (It takes about a week for this part of the activity.)
2. Put an inverted jar over the cutting in the glass of water. Place in the sunlight.
3. Put a thermometer inside the jar to monitor the temperature. Put another thermometer beside the jar to monitor the difference between the outside temperature and the temperature inside the jar. **WAIT ONE HOUR.**

Answer the following questions:

1. What happens to the temperature inside the jar?
Why do you think that is?
2. What happens to the water inside the jar?
Why do you think that happens?



HINT: The jar works the same way as the **UMBRELLA LAYER** in a rain forest. It traps the moisture and the heat.

- *After the experiment, plant your cutting in a moist, shaded area and watch it grow or keep it as a classroom plant.*

Extension: Use an aquarium with a glass lid to plant your own self-watering "rain forest."

Materials: A large aquarium; gravel; charcoal; rich soil; small stones; plants

Directions: Layer gravel and then charcoal (both available at an aquarium shop) on the bottom of the tank.

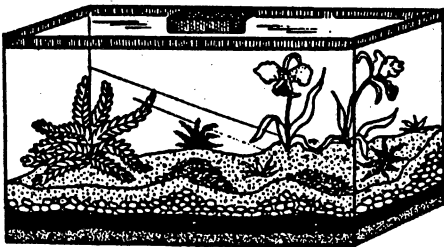
Spread small stones over the gravel charcoal layer; create small hills and valleys.

Cover the stones with about an inch of soil.

Dampen the compost with water and plant the greenery.

Cover the aquarium with a glass top (or plastic wrap). Keep in a warm spot out of direct sunlight.

You may have to add a little water every few months.



Rainforest In A Jar

1. Place cutting in cup of water.
2. Put this under an inverted jar with a thermometer inside the jar and one outside.
3. Place these in direct sunlight.
4. Wait at least one hour.
5. Check thermometers.



	Temperature Sample				Average
	A	B	C	D	
Temperature Before	In 74°F Out 74°F	In 70°F Out 74°F	In 78°F Out 73°F	In 70°F Out 72°F	In 72°F Out 70°F
Temperature After	In 94°F Out 88°F	In 90°F Out 74°F	In 98°F Out 78°F	In 90°F Out 80°F	In 93°F Out 80°F

Prediction: I think the inside thermometer will change. I think the outside thermometer will stay the same.

Results: The inside temperature was hotter than the outside temperature.

Apply these findings to what you know about rainforests. Write a generalization.
In the rain forest it stays hot all year round because the canopy traps the sunlight.

Your Own Rain Forest

Since a rain forest may be inaccessible to your location, create a miniature version of the tropical region right in your classroom. All the materials necessary for completion of this project are listed below; directions and suggested uses follow.

Materials

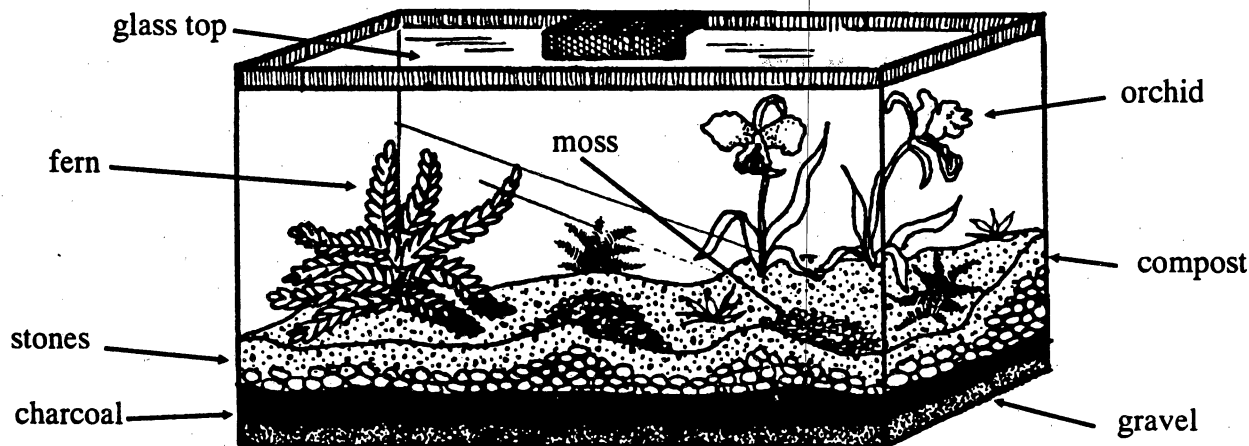
A large fish tank; gravel; charcoal; compost; small stones; exotic plants (delicate ferns, small orchids, moss, bromeliads, etc.); water

Directions

- Layer gravel and then charcoal (both available at an aquarium shop) on the bottom of the tank.
- Spread small stones over the gravel/charcoal layer; create small hills and valleys.
- Cover the stones with about an inch of compost.
- Dampen the compost with water and plant the ferns, orchids, moss, and bromeliads. Allow plenty of growing space between plants.
- Cover the aquarium with a glass top. Keep in a warm spot out of direct sunlight.
- You may have to add a little water every few months.

Suggested Uses

- **Writing Assignment.** Tell students to write complete directions describing how to build their own tropical rain forest.
- **Observation Journals.** Have the students observe the rain forest at regular intervals. Tell them to record the date and time on each page as well as any changes that have occurred. Measure any plant growth; draw pictures or sketches.
- **Questions.** Ask pertinent questions about the indoor rain forest. For example, Why does the rain forest require so little water? What processes are taking place inside the aquarium? What might happen if the plants are planted too close together?

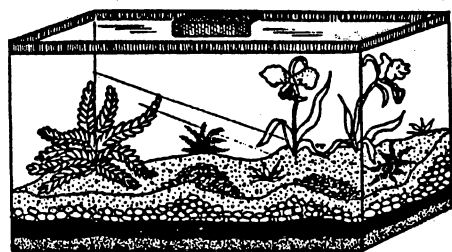


Studying the Tropical Rain Forest

Jungles are dense growths of trees and other vegetation thriving in tropical regions. They are usually a part of a larger area of rain forest. In a jungle, light is able to reach the ground level, causing profuse, tangled vegetation there. Explorers often must cut a path in order to walk through a jungle.

The larger areas of tropical forests, called rain forests because they receive more than 100 inches (250 cm) of rain per year, have fairly clear ground areas because the tall trees shut out the light to the floor of the forest. These forests are located in climatic areas where hot temperatures are nearly constant year-round, so the trees, shrubs, and plants that comprise them are green and lush all year.

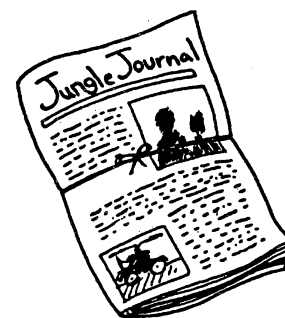
The rain forests are one of the richest regions on the earth. As many as five million plants, animals, and insects (about 50 per cent of all living things!) live there. Most of them have not yet been discovered, studied, and named.



Use pages 47 to 63 to help your students learn more about the rain forests and what is happening to them. You will find where these forests are located, why they are disappearing, and what problems this is causing for our planet.

To enhance your study of the jungle, you may wish to do one or more of the following activities:

1. Make a class rain forest mural. Use pages 48, 50, and 51 to help.
2. Plant your own rain forest in an aquarium. See page 49 for directions.
3. Turn your classroom into a rain forest. Turn up the heat and run a vaporizer to simulate the heat and humidity. Use fat green yarn with attached construction paper leaves and flowers to drape the walls and lights with "vines." Use carpet tubes and painted cutouts from appliance boxes to make giant trees.
4. Create a poster with a "Save the Rain Forests" theme.
5. As a class, make a newspaper called *The Jungle Journal*. Include factual articles about the rain forests, an editorial about why they should be saved, want ads for endangered species of jungle plants and animals, etc.
6. Write for information about rain forests and what you can do to help save them. The following organizations provide such information if you include a stamped, self-addressed envelope:



Nature Conservancy International
1800 North Kent Street, Suite 800
Arlington, VA 22209

Rainforest Information Centre
PO Box 368
Lismore, NSW 2480
Australia

Creating Our Future
398 North Ferndale
Mill Valley, CA 94941

Ask for "How to Organize a Rainforest Awareness Week at Your School."

Rainforest Action Network
300 Broadway, Suite 28
San Francisco, CA 94133

LESSON PLAN

DETAIL SHEETS AND IMPORTANT BOOK

Objective: Students will read or listen to a variety of stories and nonfiction materials in order to complete research sheets on the plants, animals and people of the rain forest. They will then use these sheets to write and illustrate a book about the rain forest.

Materials: numerous books about the rain forest from bookstores or the library
(see bibliography for suggested books)

detail worksheets

blank books or paper with which to create books

The Important Book, by Margaret Wise Brown

Procedure: Prewrite: Explain to students that they will be doing research to gain knowledge about the different plants, animals and people of the rain forest in the categories listed on their detail sheets. Working with partners or in cooperative groups students will skim through reference materials to find details about the different forms of life, writing them on the worksheets.

Write: After the sheets have been completed, students will use the details they have accumulated to write a pattern book of their own on the rain forest. Read them The Important Book by Margaret Wise Brown and discuss the pattern and technique the author uses. It may be beneficial to write one or two of the passages for the rain forest

books together as a class to assist students in identifying the pattern for themselves. Students will then write a rough draft of their Important Book, and proceed with the remainder of the steps in the writing process to edit, revise and publish their books.

Evaluation: Students will have met the objective if their books demonstrate an understanding of basic environmental principles regarding the rain forest and their writing includes details about the life of that ecosystem.

The most important thing about the rain forest is _____

But the most important thing about the rain forest is _____

The most important thing about the location of the rain forest is _____

But the most important thing about the location of the rain forest is _____

The most important thing about the water in the rain forest is _____

But the most important thing about the water in the rain forest is _____

The most important thing about the animals of the rain forest is _____

But the most important thing about the animals of the rain forest is _____

The most important thing about the birds of the rain forest is _____

But the most important thing about the birds of the rain forest is _____

The most important thing about the insects of the rain forest is _____

But the most important thing about the insects of the rain forest is _____

The most important thing about the plants of the rain forest is _____

But the most important thing about the plants of the rain forest is _____

The most important thing about the flowers of the rain forest is _____

But the most important thing about the flowers of the rain forest is _____

The most important thing about the trees of the rain forest is _____

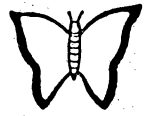
But the most important thing about the trees of the rain forest is _____

The most important thing about the people of the rain forest is _____

But the most important thing about the people of the rain forest is _____


The most important thing about the dangers to the rain forest is _____

But the most important thing about the dangers to the rain forest is _____



Layers of Life Animal Chart

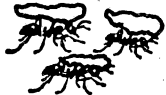



Amphibians	Layer	Picture	Appearance	Food	Enemies	Special Characteristics
						



Layers of Life Animal Chart




Insect	Layer	Picture	Appearance	Food	Enemies	Special Characteristics
						
						



Layers of Life Animal Chart





Bird	Layer	Picture	Appearance	Food	Enemies	Special Characteristics
						



Layers of Life Animal Chart

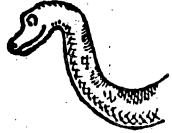



Mammal	Layer	Picture	Appearance	Food	Enemies	Special Characteristics
						
						



Layers of Life Animal Chart



Reptile	Layer	Picture	Appearance	Food	Enemies	Special Characteristics
						
						

People of the Rain Forests Chart

Habitat

Behavior/Culture

Reference



Layers of Life Plants Chart



Plant	Layer	Picture	Appearance	What lives in or on it?		Special Characteristics



Layers of Life Animal Chart



ACROSS THE CURRICULUM

Reptile	Layer	Picture	Appearance	Food	Enemies	Special Characteristics
the blunt-headed-ree snake	canopy Understory floor		<ul style="list-style-type: none"> ① skinny ② long ③ ugly ④ big eyes ⑤ slimy ⑥ scaly 	<ul style="list-style-type: none"> ① lizards ② other small insects ③ other small creatures 	<ul style="list-style-type: none"> ① eagles 	<ul style="list-style-type: none"> ① they can stretch their bodies long distances.
color-changing hamelions	floor		<ul style="list-style-type: none"> ① long tongue ② long tail ③ it looks like a small mouse ④ long clawed toes 	<ul style="list-style-type: none"> ① insects 	<ul style="list-style-type: none"> ① snakes ② birds 	<ul style="list-style-type: none"> ① long sticky tongue to catch insects. ② long flexible tail to support and protect the body. <p>(over)</p>
anole	Understory		<ul style="list-style-type: none"> ① small ② beaky black eyes ③ scaly 	<ul style="list-style-type: none"> ① insects ② fruit 	<ul style="list-style-type: none"> ① big birds ② big cats 	<ul style="list-style-type: none"> ① their color changes so it can blend in with things.
Common Iguana	floor		<ul style="list-style-type: none"> ① grayish black ② long tail 	<ul style="list-style-type: none"> ① plants ② fruit 		<ul style="list-style-type: none"> ① good swimmers so they can get away from their enemies.

LESSON PLAN
AUTHOR'S PURPOSE

Objective: Students will be able to identify with 80% accuracy the author's purpose in writing: to inform, to amuse, to advertise, and to teach a moral.

Materials: variety of stories or nonfiction about the rain forest
author's purpose chart worksheets
large chart

Procedure: This will be an ongoing lesson, completed each time a book is read to or by the students.

Before reading the first book, write the four possible purposes for writing on the board and discuss, with examples, each one so that students understand the meaning of each term. After each book is read, have students suggest ideas regarding what they feel the author's purpose is in writing. When consensus is reached on the main purpose, it should be recorded both on the individual chart and on the class chart that is posted. It may be necessary to identify a secondary purpose in some books. Differentiating between fiction and nonfiction can be done at the same time.

Evaluation: Students will be able to identify with 80% accuracy the author's purpose for writing a given passage.

LESSON PLAN
DAILY WRITING ACTIVITIES

This activity is from the commercially prepared publication Thematic Unit: Jungle.

Objective: Students will engage in an informal writing activity each day to reinforce the concepts that have been taught. The purpose of each activity will vary according to the instruction of the previous day.

Materials: Writing worksheets
attendance graphing cards
lesson plans from the resource book

Procedure: See attached resource sheets.

Evaluation: Students will respond to the daily writing prompt with a clear paragraph including main idea, supporting details and a conclusion.

Daily Writing Activities

Name Magnet

Make name magnets for each child.

Directions and patterns on page 39.

Note: If you do not have a chalkboard or other area for magnets, use sticky notepaper instead of name magnets.



Attendance Graphing

Before the children arrive each day, write a question on the board. As students enter the room, they move their name magnet from the holding zone to answer the question. (See diagram below.) This is called attendance graphing since the absent students' magnets will be left in the holding zone.

Holding Zone <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px;">Jack</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px; margin-left: 40px;">Jill</div>	What would you rather be?							
	monkey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	tiger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*See suggested questions page 38.

Jungle Log

Have each student make a booklet by stapling the Jungle Log cover (page 40) to several sheets of writing paper. Students should write and elaborate on their answer to each day's attendance graphing question. The writing may be illustrated. This is a quiet activity to use while taking roll, collecting homework, etc. Allow at least 10 minutes.

Talk Around

In groups of 3 to 5, students take turns sharing their log entries and showing their illustrations. Simple rules should be followed:

1. Only one person speaks at a time.
2. Everyone has eye contact with the speaker.
3. Each person has a turn and must speak loudly enough for everyone in the group to hear.

Doing a Talk Around daily gives students excellent practice in listening and speaking and makes sure their writing has an audience. It also gives children a chance to know one another better — an opportunity which is good for class unity and pride.

Daily Writing Activities *(cont.)*

Mathematical Summary Statements

Students write sentences about the day's attendance graph. Each sentence must contain a mathematical concept.

For example: Seven students would rather be monkeys.

More students would like to be tigers.

One less student would rather be a monkey.

A greater number of students would rather be tigers.



Not acceptable: I would like to be a monkey.

Monkeys are better than tigers.

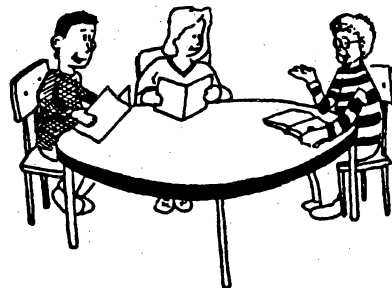
Tigers weigh more than monkeys.

These may be written as word problems and traded for solving. For example, "How many more students would rather be tigers than monkeys?" This activity is good to use for 10 or 15 minutes at the beginning of a math period.

Round Table (a cooperative learning technique)

After students understand and can apply summary statements, use this procedure.

1. Divide students into groups of 3-5.
2. Each group has one piece of paper and one pencil.
3. The teacher sets a time limit and gives a signal for all groups to begin. The first person in each group writes a math summary statement then passes the paper and pencil to the next person. When the second person is finished writing a summary statement, he/she passes it to the third person, and so forth.
4. The paper goes "round the table" as many times as possible before the signal is given to stop. Each group counts and records the number of summary statements written.
5. Collect all papers. Using the paper with the greatest number, read the statements and determine as a class if they are accurate.
6. Encourage the group with the most statements to share why they succeeded. Record techniques on a chart. Students will learn that cooperation = success.



Daily Writing Activities *(cont.)*

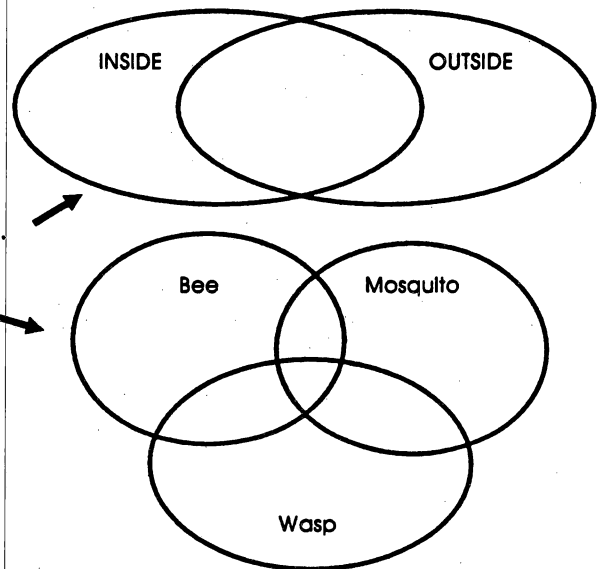
Jungle Log Suggestions

General Ideas:

1. Would you rather be a monkey or a tiger?
2. Would you rather be an anteater or an ant?
3. Would you rather live in a jungle or on an Alaskan island?
4. If you were an animal, would you rather live in the jungle or the zoo? (Consider safety, availability of food, freedom, etc.)
5. Would you rather be a parrot, a piranha, or a python?
6. Would you rather be a botanist (study plants), an entomologist (study insects), or an ichthyologist (study fish)?

Related to *Why Mosquitoes Buzz in People's Ears*:

1. Use on Day 1 — Would you rather be an ant, a grasshopper, or a mosquito?
2. Use on Day 2 — Where did you find the objects for your animal sounds? Show students how to use this type of diagram to answer questions. Be sure that they understand that the overlapping area means both.
3. Use on Day 3 — Have you been stung or bitten by one of these?
4. Use on Day 4 — Which animal in the story did you think was the most foolish? (mosquito, iguana, crow, python)
5. Use on Day 5 — Which animal in the story did you think was the most foolish? (owl, rabbit, monkey, iguana)



Related to *A Story, A Story*:

1. Use on Day 1 — Which story do you like best? (Three Little Pigs, Three Billy Goats Gruff, The Gingerbread Man, Hansel and Gretel)
2. Use on Day 2 — What bait would you use to catch a fairy that no man has ever seen? (honey, tiny fur coat, roses, hamburger)
3. Use on Day 3 — Which do you think would be hardest to catch? (hornet, leopard)
4. Use on Day 4 — If you could build a spider web ladder, where would it take you? (top of Mt. Everest, top of Jack's beanstalk, the moon)
5. Use on Day 5 — Which character do you think was the most foolish? (hornet, leopard, fairy)

Related to Endangered Species report writing:

1. Which do you think is the best way to protect an endangered species? (preserve natural environment, capture and raise offspring in zoos)
2. You can write one letter to an important person urging them to protect the rain forest. Who will you write to and why? (The President of the United States, the Secretary of the United Nations, the head of the government where the rain forest is located, the head of a company that is destroying the rain forest, etc.)

Math Summary Statement

Math Summary Statement

Math Summary Statement

DAILY WRITING ACTIVITIES

I would rather be a monkey than a jaguar. Only because monkeys are not as mean as jaguars and I'm not that me. Also because monkeys swing from tree to tree and I swing from branch to branch on trees. But I'm glad I'm a kid.

ath Summary Statement 6 more people wanted to be a monkey than a jaguar.

I would rather live in the Understory than in the floor or in the canopy or in the emergent trees. Only because it would be the easiest to get up down on. Also because if I fell I wouldn't get hurt because I'm not that high up. Also because I would be able to see things on the floor because I'm low enough. That's why I would rather live in the Understory.

ath Summary Statement More than half of the people in our class would rather live in the Canopy.

I have only been bitten by mosquitos. I have never been stung by a wasp or a bee. I usually get bitten by mosquitos when I go to my grandma's for the fourth of July. Only because we go outside to watch some fireworks. It doesn't really hurt that much, but it itches a lot. I hope I never get stung by a bee or a wasp either.

ath Summary Statement 2 out of 31 people in our class have not gotten stung or bitten by a bee, wasp, or a mosquito.

LESSON PLAN
THE WATER CYCLE

This activity is from the Water, Precious Water book from Project AIMS.

Objective: Students will construct a miniature water cycle using a plastic bag and a cup. They will then observe the results of the investigation, record the data, and draw a conclusion about the water cycle and its relationship to the rain forest.

Materials: small ziploc bags
4 oz. plastic cups
masking tape

Procedure: See attached resource page.

Evaluation: Students will draw reasonable conclusion from the investigation and be able to explain how the steps in the water cycle are demonstrated. They will the generalize the information to the rain forest environment.

THE MINI WATER CYCLE

I. Topic Area
Water cycle

II. Introductory Statement

This activity will demonstrate the processes of evaporation and condensation within a miniature water cycle inside a plastic bag.

III. Math Skills

a. Measuring

Science Processes

a. Observing

b. Recording

c. Generalizing

IV. Materials

quart size zip-lock baggies
bathroom size, clear plastic Solo cups — 3.5 oz.
masking tape

V. Key Question

What happens to liquid water when it evaporates in a closed system such as a zip-locked baggie?

VI. Background Information

See background information on water cycle information. As the water *evaporates*, it is invisible. As the water vapor cools (or slows down its molecular motion) it *condenses* and returns to a liquid state. Water droplets may form at the top and sides and slowly collect at the bottom of the baggie.

VII. Management Suggestions

1. Be sure to tape the baggie on an angle, like a diamond, so that the sides will slant down from the top allowing the droplets to slide down and collect in the bottom of the baggie.
2. Place in a sunny, warm spot.
3. You may need to tape the cup to the inside of the baggie so that the water will not tip over.

VIII. Procedure

1. Review with the students the natural water cycle stressing the processes of evaporation, condensation, precipitation, and accumulation.
2. Tell students they will create a very simple water cycle in a closed baggie and observe how water invisibly *evaporates* from the cup, like it does from oceans, *condenses* on the sides of the baggie, like it does in the clouds and accumulates in the bottom of the baggie like it does in lakes, rivers and ground water.

3. Pass out a baggie and cup to each student, or group of students. Place approximately 2 ounces of water in the cup and mark the water line. Tape the cup to the inside of baggie to prevent spilling.

4. Close the baggie tightly and tape it in a warm place, tilted on an angle like a diamond. See activity sheet.

5. Pass out student observation sheet and record what happens over a 4 day period.

What the Students will do:

1. Assemble the mini-solar still.
2. Observe the changes over a 4-day period.
3. Draw pictures of the changes.

IX. Discussion Questions

1. Correlate the various steps of the natural water cycle to the cycle in the baggie. See "Moving Water" lesson in this book.
2. Ask students what they think will happen to the water in the cup.
3. How does the place where the mini water cycle is put affect the amount of water that collects in the bottom of the baggie?
4. What would happen if the solar still was left in a warm place for 1 month?

X. Extended Activities

1. Perform the same experiment again with salt water instead of plain water. This is one method of desalination, that is, separating salt from salt water by evaporation.
2. Perform the same experiment varying the light, color of baggie, amount of water, size of baggie, etc.
3. Perform the same experiment using different liquids such as, milk, rubbing alcohol, 7-Up.
4. Add food coloring to the water to represent contaminants. Observe whether or not the food coloring can evaporate.

XI. Curriculum Coordinates

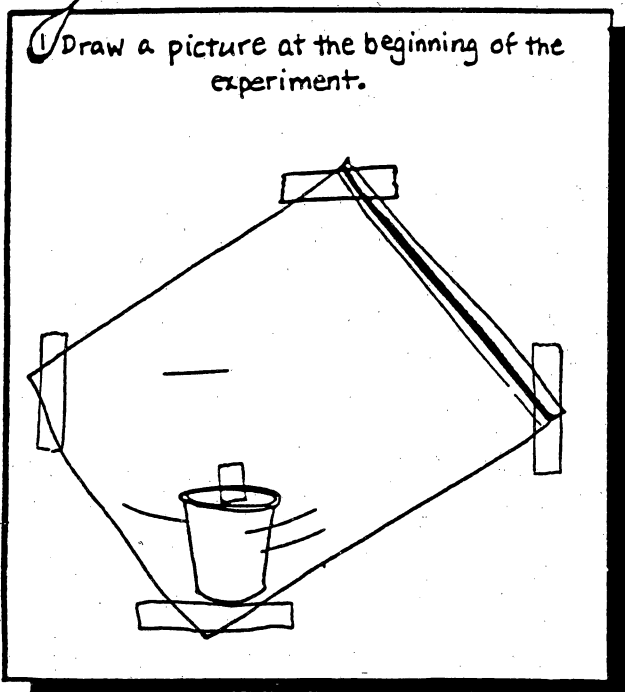
1. Language Arts: Write a story of how someone could survive with minimal water using the "water cycle in a baggie" concept.
2. Critical thinking: Design a self-watering plant container based on the "mini water cycle".
3. Math: Measure the number of milliliters of water that was evaporated from the cup over a 4-day period.

The Mini Water Cycle

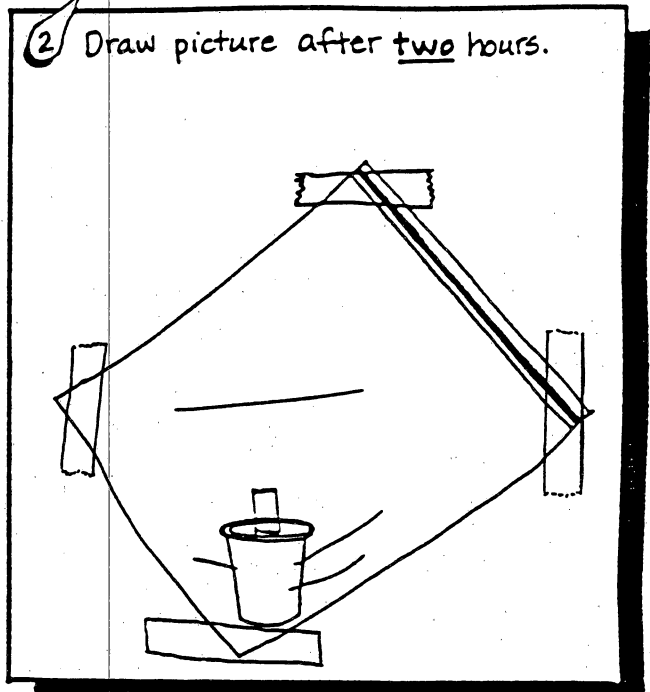
* Place your mini water cycle in a warm or sunny place.

DRAW A PICTURE OF WHAT HAPPENED TO THE WATER IN THE CUP.

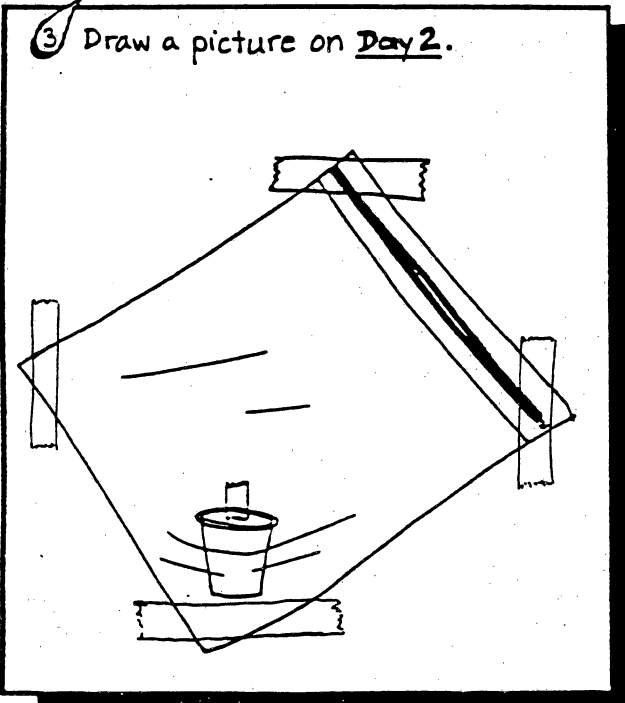
1 Draw a picture at the beginning of the experiment.



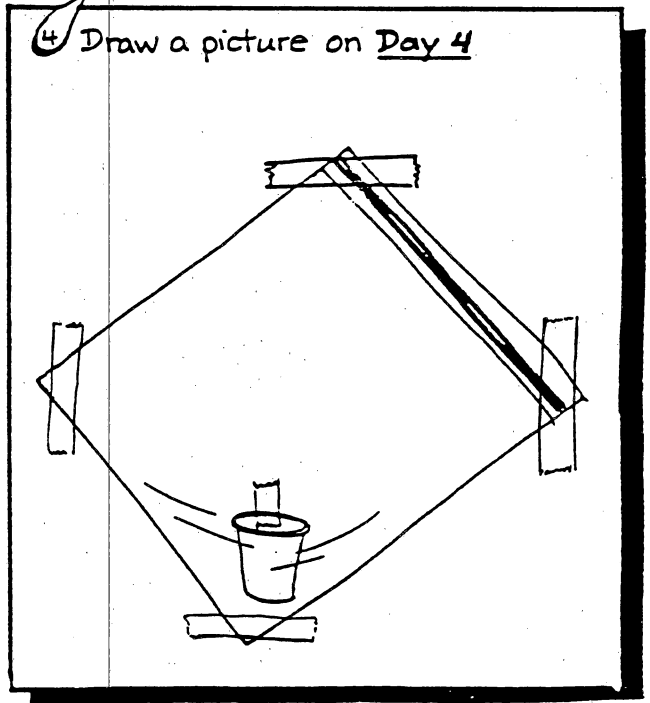
2 Draw picture after two hours.



3 Draw a picture on Day 2.



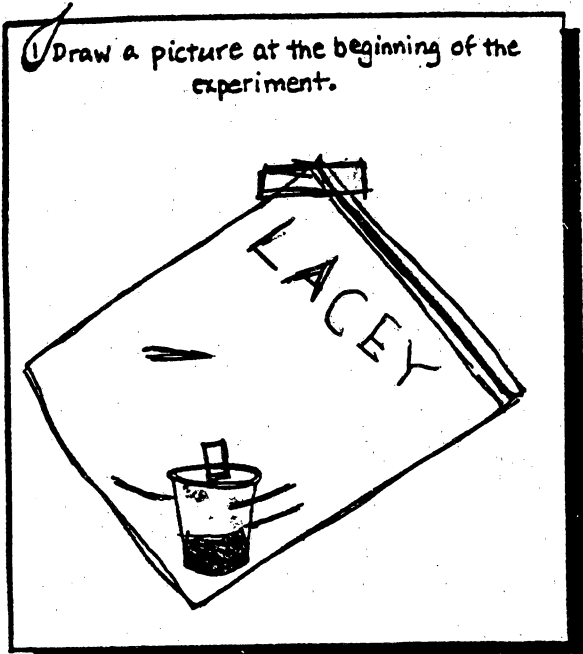
4 Draw a picture on Day 4



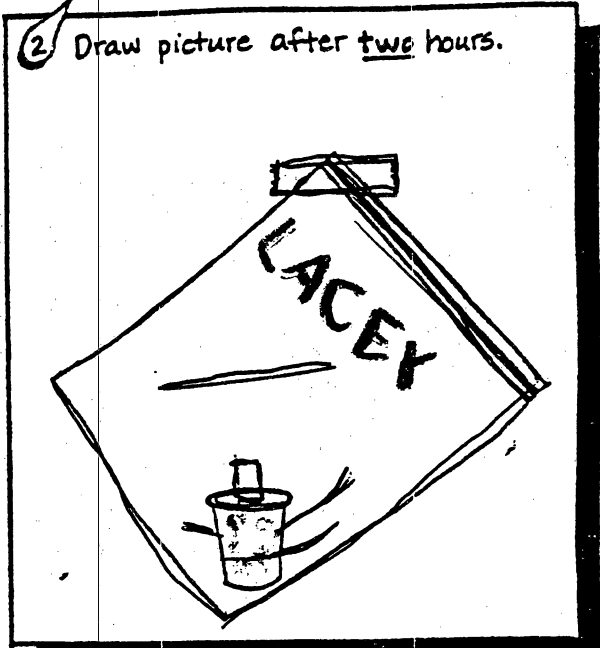
The Mini Water Cycle

● Place your mini water cycle in a warm or sunny place.
**DRAW A PICTURE OF WHAT HAPPENED TO THE WATER
 IN THE CUP.**

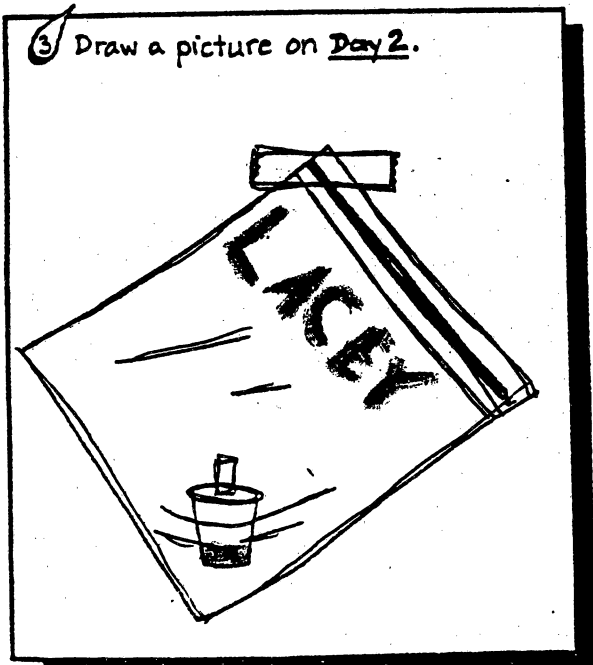
1 Draw a picture at the beginning of the experiment.



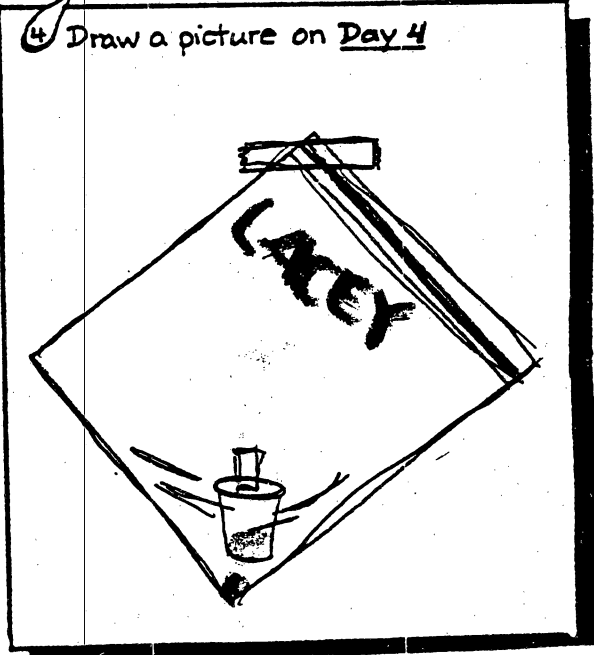
2 Draw picture after two hours.



3 Draw a picture on Day 2.



4 Draw a picture on Day 4



LESSON PLAN
PREDICTING OUTCOMES

This activity is from the commercially prepared publication Thematic Unit: Jungle.

Objective: Students will practice making predictions about the events and outcomes of a story.

Materials: A Story, A Story
Why Mosquitos Buzz in People's Ears
prediction worksheets

Procedure: See attached resource sheets.

Evlauation: Students will make reasonable predictions.

Overview of Activities

SETTING THE STAGE

1. Gather the children together so that they are comfortable and can all see the book. The illustrations are an important part of the content and the beauty.
2. Show the title page of the book. Explain that the story is an African folktale. On a map and/or globe show the children where Africa is in relationship to their country.
3. Ask the children to predict what the story will be about. Record those predictions on the chalkboard or chart paper. Later, compare the predictions with what actually happened in the book. Prediction is an important part of comprehension, so this activity is essential.
4. Read the first page of the story: "Once, oh small children round my knee, there were no stories on earth to hear. All the stories belonged to Nyame, the Sky God. He kept them in a golden box next to his royal stool."

STOP... Tell the children briefly what some of your favorite childhood stories were and why you liked them. Have them tell you what their favorite stories are and why. To save time, take only a few volunteers and then have the children turn to their neighbors and tell them. This allows all children to become actively involved and provides opportunity for oral communication. This should not take more than a few minutes.

ENJOYING THE BOOK

1. As you continue to read the book, stop when Ananse encounters each creature, and have the children predict how Ananse is going to trick and capture it.
2. Begin Big Book activity by "Goin' on a Leaf Hunt." See page 28 for Lesson I directions.

Continue the Big Book preparation by doing a lesson from pages 28-31 each day until the Big Book is completed. This activity allows students to use the language patterns from *A Story, A Story* to create their own illustrated writing.

3. **HOMEWORK ACTIVITY:** Have students take home the ANANSE GAZETTE (page 23). This will need to be explained and modeled first. There is a section for the student "reporter" to interview his teacher. Role play this with the entire class. Write out your answer so that the students can copy it onto their papers.



Capturing the Fairy Comprehension Activities

Sequencing Activity

1. Reread the section of the story where Ananse tricks and captures the fairy-whom-no-man-sees. It begins with "Ananse now carved a little wooden doll holding a bowl." It ends "... he carried her to the tree where the leopard and the hornets were waiting." Tell students that they are going to be asked to sequence the events in this section, so they should listen carefully.
2. Put students into workable pairs. As you read the fairy section of the story once more, have the pairs enact the fairy and doll sequence.
3. Distribute page 27 and explain how to do it. If handling 11 items is too much, do the first five together as a class and have the pairs do the rest.
4. With input from each pair, agree as a class on the correct sequence. Do not tell the students if they are right or wrong. If disagreements arise, refer to the text for answers. You will be modeling an important skill.

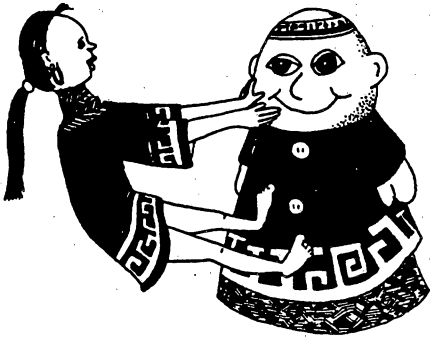
Creating a Story Board

Materials (per group): 12" X 18" (30 x 45 cm) sheets of white drawing paper; sequence strips from How Ananse Caught the Fairy (page 27); white glue; crayons, markers, and colored pencils

Procedure:

1. Divide students into groups of 6. Use the pairs from the sequencing activity and group 3 sets. Give each pair a sheet of paper so that each group has 3 pieces of paper.
2. Have the students fold each of the three 12" X 18" papers into fourths and number the boxes 1-12.
3. In the first box have them write the title, "How Ananse Caught the Fairy," and their names.
4. Have students glue their sentence strips onto the story boards in the correct sequence.
5. The pairs should work together to illustrate each section. Encourage them to fill the spaces. Have them refer to the text when they wish. Students should try to duplicate the illustrator's style. Allow 45 minutes to an hour for this activity. Circulate and praise students who are filling in the entire box and creating an interesting background. You will get great results!
6. Attach sheets with tape and display. Fold accordion style to add to classroom library.

How Ananse Caught the Fairy



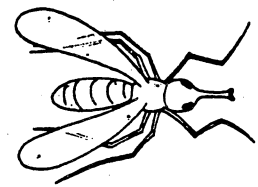
Working with a partner, cut apart the sentences below. Arrange them in correct order. Be sure you and your partner agree.

Cut along lines.

-
- (A) The fairy pushes the doll with her feet, and her feet stick.
-
- (B) Ananse filled the bowl with yams.
-
- (C) The fairy sees the doll.
-
- (D) Ananse then takes the fairy, the leopard, and the hornets to the Sky God.
-
- (E) The fairy thanks the doll for the yams.
-
- (F) The fairy slaps the doll again and the other hand sticks.
-
- (G) Ananse put the doll under the flamboyant tree and hid behind a bush.
-
- (H) Ananse carved a doll holding a bowl.
-
- (I) The fairy slaps the doll and her hand sticks.
-
- (J) When the doll doesn't answer, the fairy gets angry.
-
- (K) The fairy eats the yams.
-

Animal/Action/Sound Chart

Work with your partner. After reading the story, *Why Mosquitoes Buzz in People's Ears*, use the Matching Game cards (page 8) to create an accurate chart.



Animal	Picture	Action	Sound
Iguana			
Iguana			
Python			
Rabbit			
Crow			
Monkey			
All animals			
Monkey			
Mother Owl			
Lion			

LESSON PLAN
THE VANISHING RAIN FOREST

This activity is from the commercially prepared publication Thematic Unit: Jungle.

Objective: Students will infer the magnitude of the loss of the rain forest by computing how much is lost in relation to city blocks and creating a graphic image of how much land is land used for grazing cattle to make ground beef for hamburgers.

Materials: worksheets from resource book
chalk
calculators
measuring tapes

Procedure: See attached resource sheets.

Evaluation: Students will correctly compute the rate of rain forest deforestation, will label the map accordingly, and will participate in the physical representation of the activity.



The Vanishing Rain Forest

Each minute of each day, an area of rain forest the size of 10 city blocks vanishes from the Earth.* Use a calculator to complete the following tables to find out how much rain forest disappears each year. (**Note:** Measurements are approximate and rounded. Do not write in gray areas.)

Table 1

1 minute	10 blocks
2 minutes	20 blocks
3 minutes	
4 minutes	
5 minutes	
6 minutes	
7 minutes	
8 minutes	
9 minutes	
10 minutes	
60 minutes	

Table 2

hour	600 blocks	8 sq. miles (13 sq. km)
hours		
hours		
hours		
hours		
hours		
hours		
hours		

Table 3

1 day	192 sq. miles (312 sq. km)
2 days	
3 days	
4 days	
5 days	
6 days	
7 days	

Table 4

1 week	1,344 sq. miles (2,184 sq. km)
2 weeks	
3 weeks	
4 weeks	
5 weeks	
10 weeks	
50 weeks	
52 weeks	

out how much rain forest vanishes each year? _____
 ounded to nearest 10,000

The Vanishing Rain Forest



Each minute of each day, an area of rain forest the size of 10 city blocks vanishes from the Earth.* Use a calculator to complete the following tables to find out how much rain forest disappears each year. (Note: Measurements are approximate and rounded. Do not write in gray areas.)

Table 1

minute	10 blocks
minutes	20 blocks
minutes	30 blocks
minutes	40 blocks
minutes	50 blocks
minutes	60 blocks
minutes	70 blocks
minutes	80 blocks
minutes	90 blocks
minutes	100 blocks
0 minutes	600 blocks

Table 2

hour	600 blocks	8 sq. miles (13 sq. km)
hours	1,200 blocks	16 sq. miles (26 sq. km)
hours	1,800 blocks	24 sq. miles (39 sq. km)
hours	2,400 blocks	32 sq. miles (52 sq. km)
hours	3,000 blocks	40 sq. miles (65 sq. km)
hours	3,600 blocks	48 sq. miles (78 sq. km)
hours	7,200 blocks	96 sq. miles (156 sq. km)
hours	14,400 blocks	192 sq. miles (312 sq. km)

Table 3

1 day	192 sq. miles (312 sq. km)
2 days	384 sq. miles (624 sq. km)
3 days	576 sq. miles (936 sq. km)
4 days	768 sq. miles (1,248 sq. km)
5 days	960 sq. miles (1,560 sq. km)
6 days	1,152 sq. miles (1,872 sq. km)
7 days	1,344 sq. miles (2,184 sq. km)

Table 4

1 week	1,344 sq. miles (2,184 sq. km)
2 weeks	2,688 sq. miles (4,368 sq. km)
3 weeks	4,032 sq. miles (6,552 sq. km)
4 weeks	5,376 sq. miles (8,738 sq. km)
5 weeks	6,720 sq. miles (10,920 sq. km)
10 weeks	13,440 sq. miles (21,840 sq. km)
50 weeks	67,200 sq. miles (109,200 sq. km)
52 weeks	69,888 sq. miles (113,568 sq. km)

about how much rain forest vanishes each year? _____

American Forests, Nov. - Dec., 1988

rounded to nearest 10,000

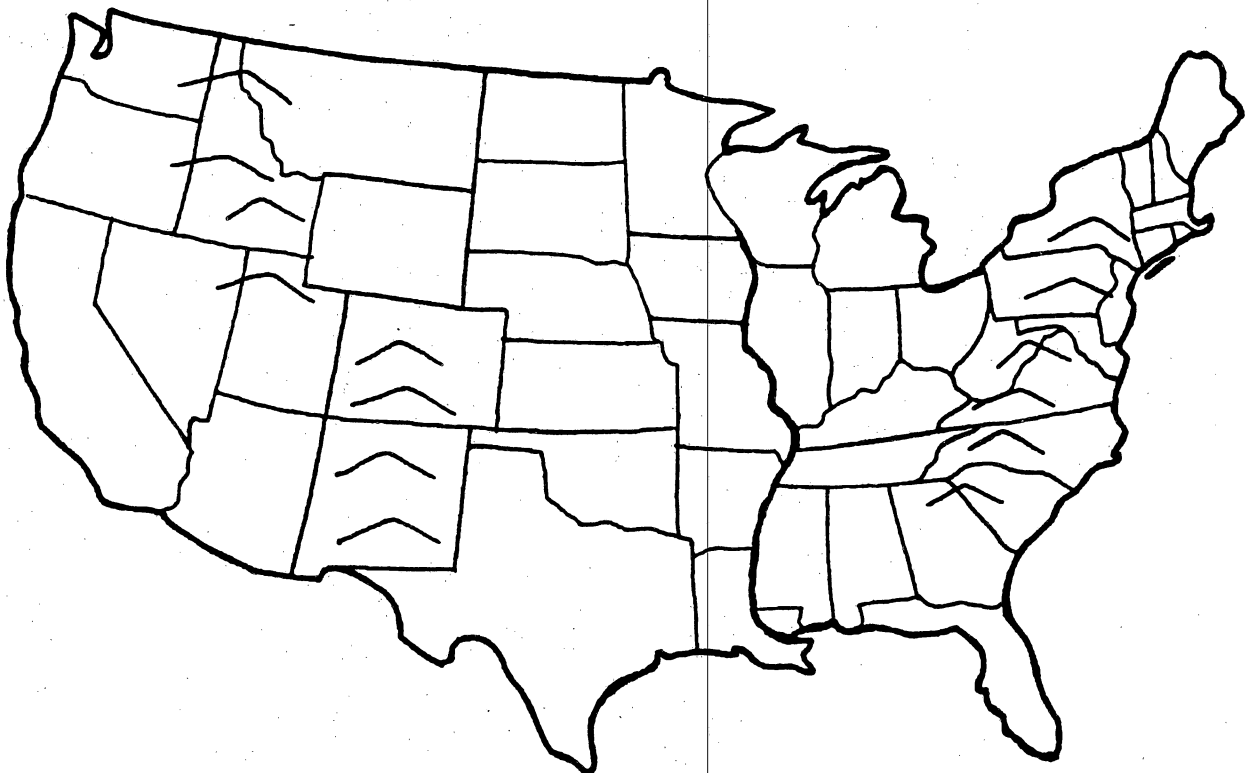
The Vanishing Rain Forest *(cont.)*

The latest estimate is that the world is losing approximately 60,000 to 70,000 square miles (114,000 sq. km) of rain forest per year. This is equal to an area about the size of the state of Washington!

Use a calculator and fill in the chart below:

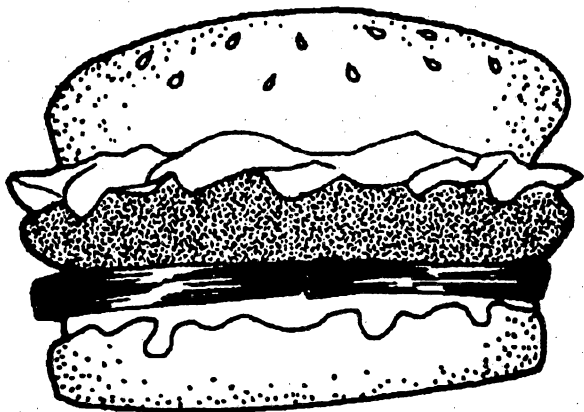
YEARS	SQUARE MILES LOST	APPROXIMATE AREA COMPARED TO THE U.S.A.
1	70,000 (114,000 sq. km)	STATE OF WASHINGTON
5		
10		ALL STATES WEST OF THE ROCKIES
15		
20		
25		
30		ALL STATES WEST OF THE MISSISSIPPI RIVER
35		
40		
45		ALL STATES WEST OF THE APPALACHIAN MOUNTAINS
50		ALL STATES IN THE CONTINENTAL U.S.A.

Imagine that the U.S.A. is a rain forest. On a map, shade the areas that disappear at 1, 10, 30, 45, and 50 years in different colors. Make a key at the bottom to explain.



- 1 year
 10 years
 30 years
 45 years
 50 years

The Hamburger Connection



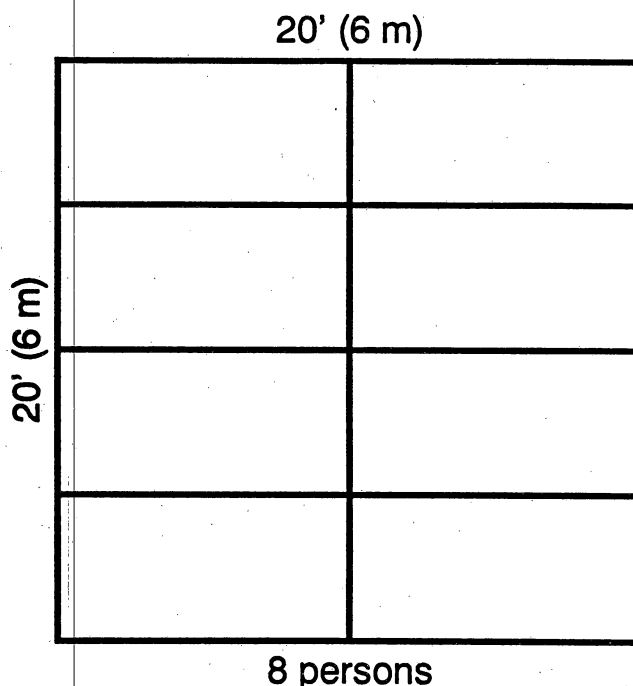
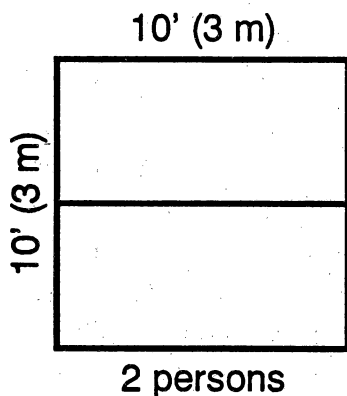
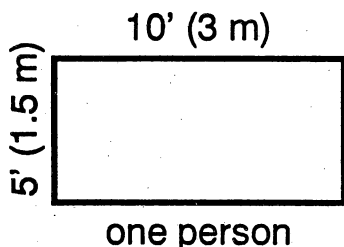
The reasons for destruction of the world's rain forests are varied. There are a combination of logging, cattle ranching, and other economic factors.

In Central America, cattle ranching is the major factor. What do you get when you clear a rain forest? HAMBURGERS! Two-thirds of Central American agricultural land is used to grow beef. Most of the beef goes to the U.S.A. to make fast-food hamburgers.

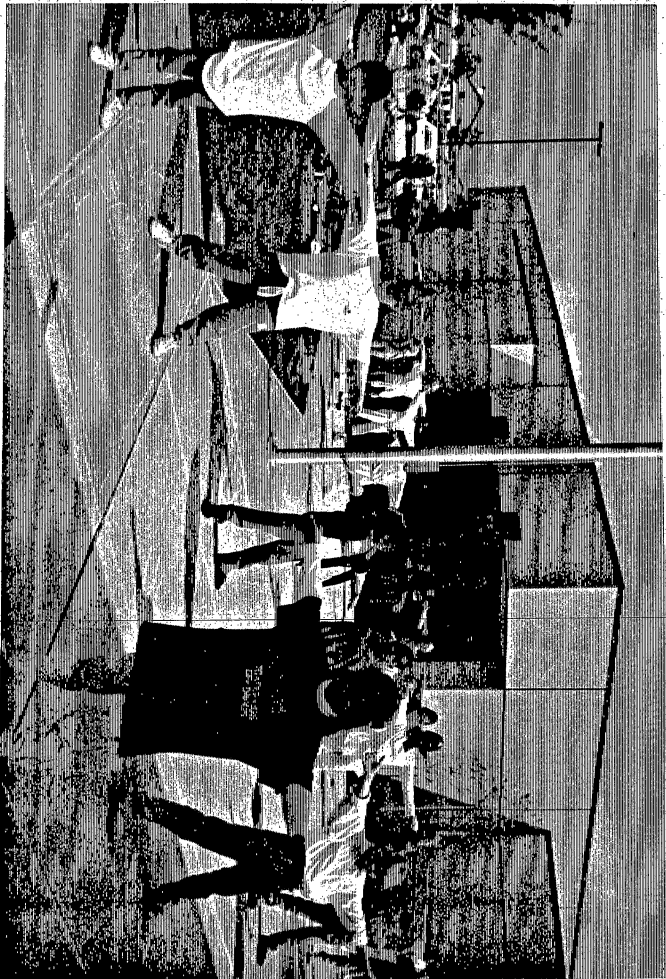
It takes about 50 square feet (4.5 sq. m) of converted rain forest land over a period of eight years to produce one hamburger!

Activity:

On your school playground, measure and mark off (use string or playing field chalk) a 50 square foot (4.5 sq. m) area for each person in your class.



Now, imagine that all this land will be used for nothing but grazing cows for eight years. At the end of that time it will produce one hamburger for each class member — only one lunch! Is this a wise use of land? Write a thoughtful answer to this question, remembering that the land would be rain forest if it had not been cleared for raising cattle.



Name _____

Date _____

RAIN FOREST UNIT TEST

Identify the author's purpose in the following passage:

1. Most rain forests are tropical rain forests. They are in the tropics, near the equator, where it is warm year-round. From the air, a lowland tropical rain forest looks like a green ocean. It stays green all year.
a. amuse b. inform c. advertise d. teach a moral
2. On a rich, green bank of the Muddy River there once lived a young hunter. In spite of his youth, he was reknowned for his bravery. No man past or present could match the accuracy of his bow. Jaguar pelts in plenty adorned his house, and his huntsman's necklaces of teeth and claws wound more than five times around his neck.
a. amuse b. inform c. advertise d. teach a moral
3. An area of tropical rain forest about the size of four city blocks is being destroyed every minute. If this continues, there may be no old rain forests left in less than seventy-five years. But there are people all over the world working to help save rain forests.
a. amuse b. inform c. advertise d. teach a moral
4. The author's main purpose in Panther Dream was to
a. amuse b. inform c. advertise d. teach a moral
5. The author's main purpose in Rain Forest Secrets was to
a. amuse b. inform c. advertise d. teach a moral
6. The main reason the water cycle is important in the rain forest is
a. animals need water to drink.
b. the rain forest's climate affects the climate of the rest of the world.
c. it wouldn't be a rain forest without rain.
7. The steps of the water cycle are
a. evaporation, condensation, precipitation
b. respiration, precipitation, perspiration
c. transpiration, respiration, precipitation

8. Sequence the events in Why Mosquitos Buzz in People's Ears.

- The lion called the animals together.
- The iguana was insulted.
- The owlet was killed.
- Mother Owl wouldn't call the sun so the day could begin.
- The rabbit said it was the snake's fault.
- Everyone still blames the mosquito.

9. Circle all the reasons we should be careful with the rain forest ecology.

- a. The animals are cute.
- b. Loss of the rain forest adds to the greenhouse effect.
- c. Many of the plants contribute to medical research.
- d. Loss of one animal can affect many others.
- e. Loss of the rain forest causes soil erosion.
- f. The bugs are busy.
- g. It's pretty.
- h. Rain forest deforestation takes away the land of native Indians.
- i. We need rain forest products.
- j. The burning of the rain forest causes air pollution.

10. Explain how the cup in the bag activity demonstrates the water cycle.

11. Why is the water cycle important to the rain forest?

12. Predict three things that might happen if we destroy the rain forests of the world.

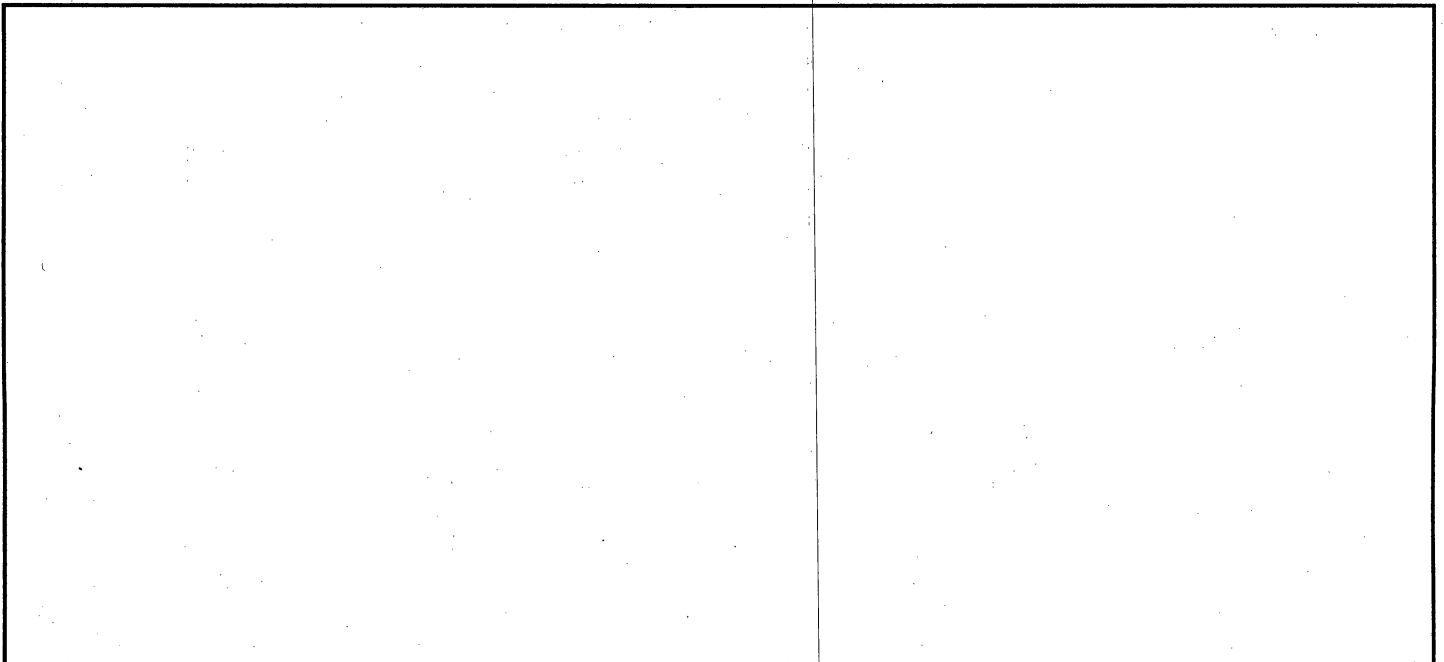
1. -----
2. -----
3. -----

Place the following words in the correct sentence.

emergent canopy dense buttress stilt capybaras deforestation
 biomass native sloths camouflage sustainable

13. Trees that grow out of the canopy in search of sunlight form the _____ layer.
14. Two mammals that live in the rain forest are _____ and _____.
15. The _____ people have lived in the rain forest for centuries.
16. The _____ layer forms a _____ roof over the forest floor.
17. The jaguar's spots _____ him in the dappled sunlight of the rain forest.
18. Tall trees in the rain forest grow _____ and _____ roots for support in the shallow soil.
19. All living things of the rain forest, plants and animals, form the _____.
20. Nuts, latex for rubber, fruits, vegetables and plants for medicine are _____ resources from the rain forest.
21. The cutting down of the rain forest trees, or _____ is one of the biggest threats to the rain forest's survival.

Draw a picture of the four layers of the rain forest (4 points). Label each layer (4 points). Draw and label at least one plant, animal or insect that grows in each layer (4 points for the pictures, 4 points for the labels).



Lucy
Class
4-3-92

I know some about the plants of the rain forest. I know that they're thick, and thin areas. I also know that they're tall and small ones. I also know that there is many colorful ones and many different kinds. There is Bromeliads, Raffia, Ceiba, Dracopis, ^Bananas, ^Banana trees, and ^Banana trees. There's about all I know about the plants of the rain forest.

I know some about the animals of the rain forest. I know that there are Reptiles, Amphibians, birds, insects, and mammals there. There are many different kinds of animals there too. There are small ones and big ones. There are skinny ones and fat ones. There are frogs, snakes, ant-eaters, chameleons, lizards, snakes, and many other animals. There's about all I know about animals of the rain forest.

I also know some about the people of the rain forest. I know that they live in many different places. They also all have different behavior and cultures. They look different. There's about all I know about the people of the rain forest.

Save Our Natural Wonders

Would you destroy,
the moon and sun?
Just because man
thinks it should be done!
As beautiful as
the rain forest may be,
It supplies riches,
the eye cannot see!
The trees of the rain forest,
should not be lost,
The environment as we know it,
will be the cost!
I don't mean to preach,
and that's for sure!
Hopefully our earth,
will always endure!

By: Lacey Clark and
Jack Clark (Dad)

Appendix B

Bibliography of Rain Forest Literature and Materials

Appendix B

Bibliography of Rain Forest Literature and Materials**BIBLIOGRAPHY OF RAIN FOREST LITERATURE****NONFICTION**

- TITLE:** Animals of the Tropical Forests
AUTHOR: Sylvia A. Johnson
PUBLISHER: Lerner Publications Company
LEVEL: grades 3-5
PRICE: out of print
SUMMARY: Different animals of the tropical forests are presented in an encyclopedia format. Good for in-depth investigations of different species.
- TITLE:** At Home in the Rain Forest
AUTHOR: Diane Willow
PUBLISHER: Charlesbridge
LEVEL: grades 2-5
PRICE: \$14.95
SUMMARY: The author takes readers through a day in the rain forest by examining the forest structure from top to bottom. She describes the plants and animals that live at each level, showing each in isolation as well as in their natural habitat. Excellent for the development of related vocabulary.
- TITLE:** Color the Rainforest
AUTHOR:
PUBLISHER: Living Planet Press
LEVEL: primary
PRICE: \$4.95
SUMMARY: This is a coloring book, but each drawing is accompanied by a descriptive sentence about the rain forest creature that is illustrated.
- TITLE:** The Enchanted Canopy
AUTHOR: Andrew W. Mitchell
PUBLISHER: Macmillan Publishing Company
LEVEL: adult
PRICE: \$29.95
DDN: 574.5264 MIT
SUMMARY: Illustrated with many beautiful photographs of life in the rain forest canopy, this book contains a great deal of background information for the teacher. Students will enjoy the pictures and captions are within intermediate reading level.

TITLE: Exploring Our World: Tropical Forests
AUTHOR: Terry Jennings
PUBLISHER: Marshall Cavendish
LEVEL: intermediate
DDN: J 910.0913 JEN
SUMMARY: Illustrated with photographs, this book gives basic information on a wide range of topics relating to the rain forest. It is a good reference book for intermediate students.

TITLE: A Field Guide to Tropical Forests Coloring Book
AUTHOR: John Kricher and Gordon Morrison
PUBLISHER: Houghton Mifflin Company
LEVEL: upper elementary
PRICE: \$4.95
SUMMARY: This coloring book is written in the style of a nature field guide, with very detailed drawings and accompanying descriptive text. It includes both plants and animals.

TITLE: Jungles
AUTHOR: Dr. Clive Catchpole
PUBLISHER: Dial Books for Young Readers
LEVEL: primary, with application for intermediate
DDN: J 574.5 CAT
SUMMARY: This book is a brief introduction to facts about the rain forests, including short sections on plants, animals, and insects but not dealing with native people.

TITLE: Jungles and Rainforests
AUTHOR: Theodore Rowland-Entwhistle
PUBLISHER: Silver Burdett Press
LEVEL: intermediate
DDN: J 574.5264 ROW
SUMMARY: One of the "Our World" series, this book gives basic information defining a rain forest, and describes plants, animals and people as well as ecological concerns.

TITLE: Just Look At...Life in the Rain Forest
AUTHOR: Neil Grant
PUBLISHER: Rourke Enterprises
LEVEL: intermediate
DDN: J 304.2 GRA
SUMMARY: Although the book deals briefly with animal and plant life in the rain forest it is primarily a reference for cultural life.

TITLE: The Mighty Rain Forest
AUTHOR: John Nichol
PUBLISHER: David & Charles
LEVEL: adult--contains some frontal nudity
DDN: 574.5264 NIC
SUMMARY: The exquisite photographs make this book fascinating to all readers, although teachers should be aware that the book contains several pictures of indigenous people in natural settings and consequently may not be appropriate for use in an elementary classroom. The book itself contains a wealth of background on the rain forest.

TITLE: Our Endangered Planet: Tropical Rain Forests
AUTHOR: Cornelia F. Mutel and Mary M. Rodgers
PUBLISHER: Lerner Publications Company
LEVEL: intermediate
DDN: J 333.75 MUT
SUMMARY: After a brief introduction to the dangers threatening the entire planet and a description of the rain forest, this book concentrates on the threat to the rain forests. It includes a chapter on what is being done to save them.

TITLE: Rainforest Animals
AUTHOR: Michael Chinery
PUBLISHER: Random House
LEVEL: upper elementary for text, all for illustrations
PRICE: \$4.99 paperback
SUMMARY: Detailed drawings and information about many of the inhabitants of the rain forest make this an excellent resource book for projects on the rain forest. Contains a glossary and index.

TITLE: Rain Forest Secrets
AUTHOR: Arthur Dorros
PUBLISHER: Scholastic, Inc.
LEVEL: grades 3-5
PRICE: \$2.50 paperback
SUMMARY: In narrative style, this book describes the rain forest in general. It discusses animals, plants, climate, location and structure of the rain forest. This book is available from Scholastic Book Clubs and may be purchased with bonus points.

TITLE: Save the Rain Forest
AUTHOR: Phoebe Yeh and Nancy Krulik
PUBLISHER: Scholastic, Inc.
LEVEL: primary
PRICE:
SUMMARY: This is a very simple coloring and activity book that gives basic information about life in the tropical rain forest.

TITLE: This Place is Wet
AUTHOR: Vicki Cobb
PUBLISHER: Walker and Company
LEVEL: primary read-aloud, intermediate read alone
PRICE: \$13.85
DDN: J 574.5264
SUMMARY: One of the "Imagine Living Here" series this book focuses on life and customs in the tropical rain forests. It is an excellent resource for multicultural discussion.

TITLE: Tropical Rainforest
AUTHOR: Arnold Newman
PUBLISHER: Facts on File
LEVEL: adult--contains some frontal nudity
PRICE: \$40.00
DDN: 574.5264 NEW
SUMMARY: This book surveys the rain forests of the world, with an emphasis on planning for its survival. Illustrated with beautiful photographs children will enjoy, but teachers should be aware the books contains pictures of indigenous people in native habitats and may not be appropriate for use in the elementary classroom.

TITLE: Tropical Rainforests
AUTHOR: Jean Hamilton
PUBLISHER: Blake Publishing
LEVEL: all
PRICE: \$7.95 paperback
SUMMARY: This book shows the rain forest in brilliant photographs with accompanying text. It does a good job of discussing the impact of deforestation and human encroachment on the forest.

TITLE: Tropical Rainforests Around the World
AUTHOR: Elaine Landau
PUBLISHER: Franklin Watts
LEVEL: grades 3-5
PRICE: \$4.95 paperback
SUMMARY: This very informative book breaks information about the rain forest into chapters on growth, trees, plants, insects, animals and birds, people of the rain forest, the importance of and threats to the rain forest. Text is accompanied by color photographs. It includes a glossary.

TITLE: Wonders of the Jungle
PUBLISHER: National Wildlife Federation
LEVEL: grades 4-5 for text, all levels for pictures
PRICE: out of print
SUMMARY: This very comprehensive book is divided into sections on life in the trees, life on the ground, and people of the rain forest. It is illustrated with excellent and diverse photographs. The reading level is upper elementary, but primary students will be fascinated with the photographs.

FICTION

TITLE: The Great Kapok Tree
AUTHOR: Lynne Cherry
PUBLISHER: Gulliver Books, Harcourt Brace Jovanovich
LEVEL: all
PRICE: \$14.95
SUMMARY: A community of animals living in a kapok tree in the Amazon rain forest unite to prevent woodcutters from cutting down the tree. In addition to the story, the text provides information about the life and structure of the rain forest. It contains a strong conservation message.

TITLE: One Day in the Tropical Rain Forest
AUTHOR: Jean Craighead George
PUBLISHER: Harper Collins
LEVEL: 2-5 interest level, 4-5 reading level
PRICE: \$11.95
SUMMARY: Minute by minute the day in a rain forest is described through the eyes of a native boy. This book, in addition to providing a wealth of information on the rain forest, also is a suspenseful story. A scientist must find one certain butterfly before the end of the day in order to stop the bulldozers from destroying a section of the rain forest. Black and white illustrations.

TITLE: Panther Dream
AUTHOR: Bob Weir and Wendy Weir
PUBLISHER: Hyperion Books for Children
LEVEL: 2-5
PRICE: \$19.95
SUMMARY: A boy journeys into the African rain forest to search for food for his family. While there he sees the many plants and animals of the forest. He communes with a panther, who teaches him the lesson of taking only what is needed. This book is accompanied by an audio tape of the story read by the author.

TITLE: Rain Forest
AUTHOR: Helen Cowcher
PUBLISHER: Farrar, Straus and Giroux
LEVEL: primary
PRICE: \$4.95 paperback
SUMMARY: The animals of the rain forest sense danger and run for high ground just before a flood, caused by deforestation, begins. The story is very simple, supplementing the brilliant painting of the illustrations.

TITLE: Tales from the Amazon
AUTHOR: adapted by Martin Elbl and J.T. Wink
PUBLISHER: Hayes Publishing Company
LEVEL: primary read-aloud, intermediate read alone
PRICE: \$10.95
SUMMARY: This collection of three folktales from the Amazon Indian tribes would be a good addition to a literature based unit that discusses the storytelling tradition.

TITLE: The Tower
AUTHOR: Arlette Lavie (illustrator)
PUBLISHER: Child's Play Ltd
LEVEL: grades 2-5
PRICE: \$5.95 paperback
SUMMARY: A country attempts to improve its way of life but creates an ecological disaster. In the process, the jungle is destroyed, water supplies are damaged, the atmosphere is unbearable. In the face of the destruction the leader searches for values that will restore his country's environment.

TITLE: Where the Forest Meets the Sea
AUTHOR: Jeannie Baker
PUBLISHER: Greenwillow Books
LEVEL: all
PRICE: \$13.75 hardcover
SUMMARY: A boy and his grandfather visit an Australian rain forest together. The boy imagines the people and animals that have lived there for thousands of years. The illustrations are collages and provide an opportunity for art integration.

RELATED BOOKS

TITLE: Danger on the African Grassland
AUTHOR: Elisabeth Sackett
PUBLISHER: Sierra Club Books, Little, Brown and Company
LEVEL: 2-4
PRICE: \$12.95
CORRELATION: African savanna, extinction
SUMMARY: A baby rhinoceros and his mother escape hunters after the mother is wounded. The book conveys the urgency of the animals as they search for the reserve where all animals are safe. One of the "Animals in Danger" series.

TITLE: Global Change
AUTHOR: Theodore P. Snow
PUBLISHER: Children's Press
LEVEL: upper elementary
PRICE: \$4.95 paperback
CORRELATION: changes in global environment resulting from human intervention
SUMMARY: This factual book, illustrated with photographs, is in an easy-to-read format that most upper elementary students will find enjoyable. It includes changes caused by people, changes in weather, water and habitats. There is a glossary.

TITLE: The Greenhouse Effect
AUTHOR: Tony Hare
PUBLISHER: Gloucester Press
LEVEL: intermediate
DDN: 333.75 HAR
SUMMARY: In simple terms this book explains what the greenhouse effect is, what causes it, the results of it and alternatives for human behavior.

TITLE: The Greenhouse Effect
AUTHOR: Darlene R. Stille
PUBLISHER: Children's Press
LEVEL: upper elementary
PRICE: \$4.95 paperback
CORRELATION: changes caused by destruction of the rain forest
SUMMARY: One of the New True series by this publisher, this book describes in detail, with photographic illustrations, how the greenhouse effect works and what changes might be caused by global warming.

TITLE: Living Treasure: Saving the Earth's Threatened Biodiversity
AUTHOR: Laurence Pringle
PUBLISHER: Morrow Junior Books
LEVEL: intermediate
DDN: J 333.95 PRI
SUMMARY: This book discusses in detail the threat to the earth's biodiversity, with emphasis on the effects of this loss to the human population. It contains information on several rain forest environments and animals.

TITLE: The People Who Hugged the Trees
AUTHOR: Deborah Lee Rose (adaptation)
PUBLISHER: Roberts Rinehart, Inc.
LEVEL: all
PRICE: \$12.95
CORRELATION: conservation
SUMMARY: This story is a retelling of an Indian folktale about a village that tried to save the nearby forest from cutting by standing in front of the trees. Although it does not take place in the rain forest, its strong conservation message and portrayal of an "action step" are directly applicable.

TITLE: Professor Noah's Spaceship
AUTHOR: Brian Wildsmith
PUBLISHER: Oxford University Press
LEVEL: primary, although the message will be enjoyed by upper grades
PRICE: \$5.95
CORRELATION: conservation, results of deforestation
SUMMARY: All the animals of the forest search out Professor Noah when the forest begins to die. He takes them aboard his spaceship and launches them on a journey to find a new world. A broken part sends them back in time to when the world was still a safe, clean place for animals.

TITLE: The Salamander Room
AUTHOR: Anne Mazer
PUBLISHER: Alfred E. Knopf
LEVEL: all
PRICE: \$14.00
CORRELATION: environmental awareness
SUMMARY: A small boy finds a salamander in the woods and brings it home. When questioned by his mother, he tells her how to create a perfect forest environment for the salamander. Excellent starting point for a discussion of biodiversity and interrelationships.

TITLE: Vanishing Habitats
AUTHOR: Noel Simon
PUBLISHER: Gloucester Press
LEVEL: intermediate
DDN: J 333.72 SIM
SUMMARY: This book has a strong conservation message regarding the loss of environmental habitats. There is one chapter on rain forests, valuable because of the pictures of deforestation.

TITLE: Whisper From the Woods
AUTHOR: Victoria Wirth
PUBLISHER: Green Tiger Press
LEVEL: all
PRICE: out of print
CORRELATION: environmental awareness, succession
SUMMARY: Trees are personified in this story of a family of trees in the forest. The mother tree watches as her seedlings grow. Eventually she dies and becomes part of the forest as another seedling grows where she has fallen.

RESOURCES FOR TEACHERS

TITLE: Ecology
AUTHOR: Linda Quick
PUBLISHER: Creative Teaching Press
LEVEL: intermediate
PRICE: \$3.98
SUMMARY: Twenty blackline masters on a variety of ecological issues, including the rain forest. All activities are adaptable to the rain forest ecology.

TITLE: Ecology for Kids
AUTHOR: Rozanne Williams
PUBLISHER: Creative Teaching Press, Inc.
LEVEL: primary with application for intermediate
PRICE: \$4.95
SUMMARY: This is a collection of blackline masters with an ecology theme. It contains a variety of different activities, including art, math, social science and physical education. Intended to be a thematic unit, the activities are loosely organized under the topic of ecology, but not based on any one literature selection. The book does contain a list of books about ecology.

TITLE: Exploring Wildlife Communities With Children
AUTHOR: Carolyn L. Kennedy
PUBLISHER: Girl Scouts of the U.S.A.
LEVEL: can be used with primary and intermediate classes
CORRELATION: pond and lake, forest, waterways, coastal areas, desert, grasslands

SUMMARY: This is a loosely structured guide to outdoor activities organized around a variety of themes. While it is not written with strict learning outcomes, the activities are motivating and interesting to children and would supplement other lessons, particularly those in texts.

TITLE: Thematic Unit: Ecology
AUTHOR: Mary Ellen Sterling
PUBLISHER: Teacher Created Materials, Inc.
LEVEL: intermediate
PRICE: \$7.95
SUMMARY: This is a collection of blackline masters intended to be used as a thematic unit. They are based on the books The Wump World and One Day in the Tropical Rain Forest. The book contains a wide variety of activities across all curricular areas.

TITLE: Thematic Unit: Jungle
AUTHOR: Leigh Hoven
PUBLISHER: Teacher Created Materials, Inc.
LEVEL: intermediate
PRICE: \$7.95
SUMMARY: This is an excellent selection of activities and accompanying blackline masters on the tropical rain forests. It includes ideas for many cross-curricular activities, with emphasis on language arts and science.

TITLE: Our Environment
AUTHOR: Mary Ellen Sterling
PUBLISHER: Teacher Created Materials, Inc.
LEVEL: primary, with applications for intermediate
PRICE: \$7.95
SUMMARY: This is a collection of blackline masters for use as a thematic unit with the literature selections The Wartville Wizards and The Great Kapok Tree. There are a wide selection of activities across the curriculum.

TITLE: The Rainforest Book
AUTHOR: Scott Lewis
PUBLISHER: Living Planet Press
LEVEL: teacher resource
PRICE: \$5.95 paperback
SUMMARY: This handbook gives background information on the rain forest and current issues regarding deforestation. There are several suggestions for action steps that can be adapted for classroom use.

TITLE: Ranger Rick's NatureScope, Rain Forests: Tropical Treasures
PUBLISHER: National Wildlife Federation
LEVEL: activities for primary through middle school
PRICE: \$7.95 paperback
SUMMARY: This is probably the most comprehensive collection of activities on the rain forest for teacher use that is available. There is extensive background information as well as lesson plans and blackline masters for classroom use.

TITLE: Save the Earth, An Action Handbook for Kids
AUTHOR: Betty Miles
PUBLISHER: Alfred A. Knopf
LEVEL: all
PRICE: \$6.95
CORRELATION: ecological awareness, social responsibility
SUMMARY: While the book is described as being for kids, it is an excellent resource for teachers as well. The book is divided into sections on land, atmosphere, water, energy, plants and animals, and people. Each section has information about current knowledge, problems and possible solutions to environmental issues. There are also descriptions of groups, schools and organizations that are taking some sort of action to bring about change. The book lists many resources for obtaining further information and taking part in some of the activities around the world.

TITLE: Vanishing Rain Forests
AUTHOR: Grace M. Lieberman and Lynne C. Hardie
PUBLISHER: World Wildlife Fund
LEVEL: all
PRICE: \$30.00
SUMMARY: This is an excellent resource that includes a videotape, a teacher's manual and a student's reference book. The teacher's manual includes background information and lessons and activities to accompany the unit materials.

Appendix C

Rain Forest Organization Database

Appendix C

Rain Forest Organization Database**INSTRUCTIONS FOR USE OF
RAINFOREST ORGANIZATION DATABASE**

YOU MUST HAVE THE APPLICATION FOR MICROSOFT WORKS FOR THE
MACINTOSH TO USE THIS PROGRAM.

PLEASE DO NOT SAVE ANY OF THE DATA YOU ENTER INTO THE COMPUTER
WHILE USING THIS DISK!

1. Load the disk.
2. Double click on the disk icon to open the file.
3. Double click on Rainforest Database icon to preview the list.
4. To print the list:
 - a. In the report menu, select rainforest report 3
 - b. in the File menu, select print
5. To print letters requesting information from all of the organizations:
 - a. In the Report menu, select Rainforest report 3.
 - b. In the File menu, select Open.
 - c. In the Open File, select and open (double click or click Open) Rainforest letter.
 - d. Change the address to the address to which you wish information sent.
 - e. Place insertion bar after the word Dear and next to the comma.
 - f. In the Edit file, select Prepare to Merge.
 - g. Select Organization, then click Merge.
 - h. In the File menu, select Print Merge.
 - i. When you click OK in the print window, the system will print individual letters to all organizations.
6. To print mailing labels for envelopes for all organizations: (You will need an Imagewriter or similar pinfeed printer)
 - a. In the Report menu, select Rainforest report 3.
 - b. In the File menu, select Open.
 - c. In the Open File, select and open labels.
 - d. When you select labels, the label for AWF should appear. If so, you can skip to step o. If not, continue with these directions.
 - e. Delete any text that is not an address.
 - f. In the Edit file, select Prepare to Merge.
 - g. Select Organization, then click Merge.
 - h. Type return so that the cursor goes to the next line.
 - i. In the Edit file, select Prepare to Merge.

- j. Select address, then click Merge.
- k. Type return, so that the cursor goes to the next line.
- m. In the Edit file, select Prepare to Merge.
- n. Select city, then click Merge.
- o. In the File menu, select Page Setup.
- p. Be sure margins are set to
left .0125 right .0125
top 0 bottom 0
- q. Check that No Gaps Between Pages is selected.
- r. Click OK.
- s. Click OK for width of document.
- t. Load labels into printer.
- u. In File menu, select Print Merge.
- v. When you click OK in the Print window, the system will print a mailing label for each of the organizations.

PLEASE DO NOT SAVE ONTO THE MASTER DISK! YOU ARE WELCOME TO COPY THE DISK FOR YOUR OWN USE.

Bear Valley Elementary School
26125 Fir Ave.
Moreno Valley, CA 92557
January 30, 1992

Dear ,

I am interested in obtaining any materials you might have available to use in teaching an elementary school unit on the rainforests, particularly classroom activities. If the materials are free, I would appreciate it if you could mail them immediately. If there is a charge, please send me the information for ordering the materials.

Thank you very much for your help.

Sincerely,

RAINFOREST ORGANIZATIONS DATABASE

Organization	address	city	CM
African Wildlife Foundation	1717 Massachusetts Ave. NW	Washington, D. C. 20036	
Center For Marine Conservation	1725 DeSales St. NW Suite 500	Washington, D.C. 20036	
The Children's Rainforest	PO Box 936	Lewiston, ME 04240	*
Conservation International	1015 18th St NW Suite 1000	Washington, DC 20036	*
Creating Our Future	398 North Ferndale	Mill Valley, CA 94941	*
Cultural Survival	11 Divinity Ave.	Cambridge, MA 02138	
Educators For Social Responsibility	23 Garden St.	Cambridge, MA 02138	
Environmental Defense Fund	1616 P St. NW Suite 150	Washington, D.C. 20036	
Friends of the Earth/U.S.	218 D St. SE	Washington, D.C. 20003	*
Global Tomorrow Coalition	1325 G St. NW Suite 915	Washington, D.C. 20005	
Greenpeace	1436 U St. NW	Washington, D.C. 20009	
National Audubon Society	645 Pennsylvania Ave. SE	Washington, D.C. 20003	*
National Audubon Society	950 Third Avenue	New York, N.Y. 10022	
National Wildlife Federation	1412 16th St. NW	Washington, D.C. 20036	*
National Zoological Park	Smithsonian Institute	Washington, D.C.	*
Natural Resources Defense Council	40 W. 20th St.	New York, N.Y. 10011	
The Nature Conservancy	1800 N. Kent St.	Arlington, VA 22209	*
Rainforest Action Network	301 Broadway Suite A	San Francisco, CA 94133	*
Rainforest Alliance	270 Lafayette St. Suite 512	New York, N.Y. 10012	
Rainforest Foundation, Inc.	1776 Broadway, 14th Floor	New York, N.Y. 10019	
Sierra Club	730 Polk St.	San Francisco, CA 94109	
Smithsonian Tropical Research Foundation	APO	Miami, FL 34002	*
Survival International USA	2121 DeCatur Place, NW	Washington, D.C. 20008	
Wildlife Conservation International	New York Zoological Society	Bronx, N.Y. 10460	*
World Resources Institute	1735 New York Avenue, NW	Washington, D.C. 20037	
World Wildlife Fund/Conservation Foundation	1250 24th St. NW	Washington, D.C. 20037	*
Zero Population Growth Inc.	1400 10th St. NW Suite 320	Washington, D.C. 20036	

*Indicates classroom materials available

Appendix D

Matrix of Goals and Lessons

MATRIX OF GOALS AND LESSONS

	Language					Science					
	Use language skills	Comprehend a variety of written material	Listens to and uses oral language	Use the writing process	Demonstrates understanding of context vocabulary	Recognize role of energy in the ecosystem	Interpret change through time as evolution	Identify patterns of change in an ecosystem	Recognize ecosystems as a hierarchy	Appreciate dynamic equilibrium in an ecosystem	Understand interactions in an ecosystem
Concept Attainment	●		●								
Maps of the rain forest		●				●			●		
Levels of the rain forest			●						●		●
<u>Rainforest Secrets</u>	●	●			●	●	●		●	●	●
<u>Panther Dream</u> visual recall	●		●		●			●			●
Rain forest mural *		●			●			●			●
Identify author's purpose	●	●	●								

MATRIX OF GOALS AND LESSONS

	Language						Science				
	Use language skills	Comprehend a variety of written material	Listen to and use oral language	Use the writing process	Demonstrate understanding of context vocabulary	Recognize role of energy in the ecosystem	Interpret change through time as evolution	Identify patterns of change in an ecosystem	Recognize ecosystems as a hierarchy	Appreciate dynamic equilibrium in an ecosystem	Understand interactions in an ecosystem
Daily writing activities	●			●			●				●
Rain Forest in a Jar	●		●			●	●	●	●	●	●
Water Cycle				●		●		●	●	●	●
Detail sheets	●	●		●	●		●	●		●	●
Important Book	●	●	●	●	●	●	●	●		●	●
<u>A Story, A Story</u>	●				●						
Predicting outcomes	●	●	●								

MATRIX OF GOALS AND LESSONS

	Language					Science					
	Use language skills	Comprehend a variety of written material	Listen to and use oral language	Use the writing process	Demonstrate understanding of context vocabulary	Recognize role of energy in the ecosystem	Interpret change through time as evolution	Identify patterns of change in an ecosystem	Recognize ecosystems as a hierarchy	Appreciate dynamic equilibrium in an ecosystem	Understand interactions in an ecosystem
Rain forest collage *											
Rain forest songs *											
Rain forest choral reading *											
Wings and Webs	●		●	●	●					●	●

* Lessons are from affective domain and not included on instructional analysis chart