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Environmental education: The equalizer

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ENVIRONMENTAL EDUCATION: THE EQUALIZER

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education:
Environmental Education

by
Jolanda Tracie Karr
June 2005
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A Project
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ABSTRACT

Teachers of severely handicapped (SH) special education students have an enormous task to meet the ever-changing qualifications of the federal laws, state laws and parental desires to give each student an appropriate education. The education must be individualized to meet the federal guidelines, the state mandates, district decrees and parental desires. To compound the entire process there is not a clear set curriculum for the severely handicapped student.

The special education teacher must structure the class to include as many aspects of the general education curriculum as possible, however, always mindful of the limits to the students monitored.

By using the natural environment, the teacher finds a common link to each individual student. The academics are able to be incorporated, parallel with the functional skills that must be taught for social acceptance in our society. Example lesson plans are included.
ACKNOWLEDGMENTS

I wish to honor the dedication and selfless hard work that Dr. Darleen Stoner, Environmental Education Coordinator at California State University, San Bernardino, has done for many years. Her tireless efforts to ignite the world to the gifts of the environment will never go unrewarded. Dr. Stoner is a gift to the teaching profession. Her wisdom is unique and always given with sunshine and a firm belief system.
DEDICATION

This body of work is dedicated to the many special education teachers who are giving of themselves because they care.
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CHAPTER ONE
INTRODUCTION

As educators, we are now told to embrace a "hands-on" approach to teaching. This kinesthetic method of teaching enables students to remember information.

As a basis for understanding how a child learns, Piaget says that a child must assimilated his environment and accommodate new thought patterns into existing ones. Concepts are not externally imposed on a child; they are attained through experience. Skills too must be gained through experience and practice using them. (Boekell & Steele, 1972, p. 2)

With experts and theorists giving the educator the exact methods to use in teaching the special education or severely handicapped (SH) student, why do educators struggle? The single fact is that there are federal laws mandating that all children must be educated; however, there is not a mandated special education curriculum. In California, school districts request teachers to teach a functional curriculum that will make the students productive citizens (Riverside County Office of Education [RCOE], 1994).

The basis of the individualized education for the special education student is the Individualized Education Plan (IEP). To develop this IEP, a team comprised of educators, student’s parents, the administrator, and often
the student, decide upon the goals that the student should accomplish during the next school year. Students are encouraged to work together to accomplish social goals, improve behavior, and achieve academic goals. Herein lies the problem for the special education teachers. Each student requires a unique plan; this creates a myriad of problems for the teacher to meet the learning needs.

This project explores and justifies using the local environment as an effective educational strategy for special education students. By using the world around them being given the responsibility to care for their world, the students gain a sense of discovery, self worth, and self-esteem. The students find answers to problems that come with everyday living. They learn to plan ahead and anticipate what needs to be done in daily situations.

This project began as a simple idea of exposing the author's special education students to raising butterflies and annual plants to attract the insects and caring for earthworms in a worm farm. The students worked very hard and did exceptionally well raising plants. They were able to understand the reasons for cultivating plants. The students grasped the concept of the life cycle with the plants, butterflies and worms (see Appendix A). Children's
literature that incorporate an environmental perspective, and also effective with students, is listed in Appendix B.

The realization that the environment could generate this educational outcome, igniting the spark of learning for the exceptional student, is a new idea to most educators. There was very little research on the subject of using environmental education to teach and guide the special education students. To discover what makes a child learn is the most exciting adventure that a teacher can embark upon. By using the environment to guide exceptional students, the teacher gives students the world back to them in their terms.

Carson in *Silent Spring* wrote, "It seems reasonable to believe that the more clearly we can focus our attention on the wonders and realities of the universe about us the less taste we shall have for the destruction of our race" (1963, p. 19). With this idea in mind, why do we as educators insist upon having all students sit at a desk for six hours? We need to teach the students to explore their world.

The Design of the Project

Long before the California State Standards were adopted, special education teachers were looking for a
“hook” to incite their students to remember the functional lessons taught. There never has been a prescribed curriculum for the teacher to use, thus teachers searched for a method to bridge the learning gap of special education students.

Each special education student has the right, by federal law, to have an individualized educational plan (IEP) that tailors learning to that own needs. With at least 15 students in each class, and 15 individual plans, the teacher must look for something to use to help the students have some form of commonality.

The commonality can be environmental education. This one avenue brings all strategies together. It bridges the familiar to the unknown in the academic world. Teachers who are equipped with very little environmental knowledge can make environmental education work for their students.

The design was to begin to use the environment in my trainable mentally handicapped (TMH) classroom, beginning with a butterfly garden and the raising of butterflies by my students of six to ten years of age (IQ’s of 68 and below). Next worms were incorporated to use in the garden. A funny thing happened on the way to using the environment. The worms made the garden so successful that we had so many tomatoes that the students were able to
make spaghetti sauce for the entire school and staff. Other teachers wanted to know how the students could accomplish such great feat. All the students of the "EE" (environmental education) group were only too happy to explain exactly what "EE" was and how easy learning had become.

The real objective was to have all nine of the special education classrooms in the school use the environment for a portion of their learning. The lessons used to engage the students and to cover the learning standards for grades one through six are in Appendix A. As result, this author perceived that the most difficult of the emotionally disturbed students became engaged in learning beyond any previous expectations. Discipline problems showed steep decline. Students began reading more and math became more enjoyable. Students were not just doing pages of math problems; instead they were measuring and discovering in real learning experiences.

EE empowered the special world of this elementary school. The students wanted to have science fairs; they requested field trips to ponds and rivers, not amusement parks. EE became the great equalizer among the students. The language barrier seemed to disappear. The students worked together to learn about each other's discoveries.
Many methods were employed to make the teaching "buy-in" to the environmental approach. The California Teaching Standards were the most helpful. The science standards overlap with many of the methods that special education teachers use to work with students who are extremely low in academic subjects. Showcasing the classroom's discoveries, parents and community partners were invited to school. The garden was so successful that three other teachers at the school began gardens for their students: a Chinese garden, Mexican garden and a California native garden.

This environment became the glue and the equalizer for learning by special education students.

Definition of Terms
American Association on Mental Retardation (AAMR) - "founded in 1876 as a multidisciplinary association of professionals" (American Association on Mental Retardation [AAMR], 2002, ¶ 2).

Adaptive Behavior Skills - "The collection of conceptual, social, and practical skills that people have learned in order to function during everyday lives" (AAMR, 2003, ¶ 11).
At-risk - "A general education or special education student who has learning disabilities due to environmental conditions, second language problems, or learning disabilities" (Long, Schnack, & Walsh-Reuss, 2002, Appendix A, p. 2).

Autism - An autistic child is "a student that has been diagnosed with pervasive developmental disorder [including communication and social disabilities]" (Long et al., 2002, Appendix A, p. 2).

California Alternative Performance Assessment (CAPA) - A test and a method of teaching to students of IQ's less that 70 that comes within compliance with "No Child Left Behind" laws for the Special Education population that are not seeking a "diploma bound" curriculum (Special Education Administrators of County Offices [SEACO], 2005).

CAPA Levels - Testing levels are made to accommodate students abilities and grade levels. For example level 1 is for students with profound disabilities and capabilities below 24 month mental age. Where level 5 is for high school students ages 15, 16, and 17 (SEACO, 2005).

Cooperative Learning - "Students working in small groups to study, solve problems and learn social skills. A
A systematic model in which the students are interdependent yet individually accountable” (RCOE, 1994, p. 122).

**Conceptual lessons** - Lessons taught using a concrete method, with hands on activities for a functional outcome.

**Conceptual skills** - Receptive and expressive language, reading and writing, money concepts, and self-directions.

**Disability** - A generic term for a continuing disability that begins in childhood (or from birth) that is not subject to rehabilitation [examples: mental retardation, autism, etc.] (Long et al., 2002, Appendix A, p. 5).

**EE** - Environmental education

**ESL** - English as a second language

**ED** - “Emotionally disturbed students that have disabilities of an emotional nature” (Long et al., 2002, Section 1, p. 6).

**Full inclusion** - “Special education student educated with general education students” (Long et al., 2002, Appendix A, p. 7).
Functional skills - "Skills taught to students that enable them to be normalized, self-care" (Long et al., 2002, Appendix A, p. 8).

General education - A setting that includes regular education classes.

Handicapped - "a word that is widely used as a synonym for disability or impairment" (Long et al., 2002, Appendix A, p. 8).

Hands-on - "Using manipulative and actual relia (objects that have meaning for a particular subject matter) to teach students and reinforce facts" (Long et al., 2002, Section X, p. 13).

IDEA - "Individuals with Disabilities Education Act, Public Law 101-476 (1975), federal legislation that requires states to provide all children with disabilities with a free appropriate public education" (Long et al., 2002, Appendix A, p. 10).

Individualized Educational Plan (IEP) - "The educational plan that governs the educational values for the student for a year's academic progress. A team of the parents, the teacher and the administrator meet yearly to develop the plan" (Long et al., 2002, Section IV, p. 6).
Intelligence Quotient (IQ) - "Intelligence is the general mental capability. It is represented by the Intelligence Quotient (IQ) obtained by standardized tests given by a trained professional. The measurement of one's intelligence, as represented by a number" (Long et al., 2002, Appendix A, p. 7).

Lesson plans - A written plan devised by teachers to teach various subject matters. The plan states objectives, materials needed, practice and modeling by the teacher for a specific amount of time: one class period, a week, a quarter, etc.

LD - Learning disabled student with mild learning disabilities.

Mainstreaming - "Integrating the student with handicapping conditions (mild or profound) into the regular education classroom to be among the nondisabled peers" (Long et al., 2002, Appendix A, p. 12).

Mental Retardation - In 2002 the American Association of Mental Retardation (AAMR) defined mental retardation as "a disability characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills" (¶ 5).
Practical skills - Daily living skills for use in the home, in school and in the community, occupational skills, and personal safety.

Severely handicapped (SH) - An individual that has one or more disabilities that impair their ability to learn and care for themselves in a functional manner. Severely handicapped students may be termed: deaf and hard of hearing (DHH), developmentally delayed (DD), Multi-handicapped (MH), orthopedically handicapped (OH), emotionally disturbed (ED), trainable mentally handicapped (TMH), and visually impaired [VI] (Long et al., 2002, Section I, p. 6).

Special Education - In 2002, the American Association of mental Retardation (AAMR) defined mental retardation as "a disability characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills" (¶ 5). Special education is the teaching and provision of individualized education for each student as provided under Section 504 of the Rehabilitation Act (PL 93-1120) or IDEA (Wood, 1998).

Social skills - "Learning to form relationships, accepting responsibility for one's actions, following rules,
and avoiding victimization” (Long et al., 2002, Appendix A, p. 17).

**Trainable Mentally Handicapped (TMH)** - “Trainable Mentally Handicapped students (IQ 45-69), whose intellectual functioning is in the moderate to severe range of abilities. The curriculum focuses on teaching daily functional and work related skills” (Long et al., 2002, Appendix A, p. 18).
CHAPTER TWO
LITERATURE REVIEW

This literature review supports the implementation of environmental education into the special education curriculum. Through the use of a science rich curriculum, the special education or mentally handicapped students are able to discover their surroundings. As stated by Boekell and Steel:

We need to teach science as a series of thought processes and inquiry skills in order to develop necessary tools that our students need now and in the future. Science can teach children problem solving skills they will need to cope with the problems of living. (1972, p. 1)

The definition of environmental education taken from the Strategic Initiatives for Enhancing Education in California is as follows:

Environmental education focuses on environmental "literacy"; learning about and caring for the total environment, understanding how humans interact with and are dependent on natural ecosystems, and developing critical-thinking skills to resolve environmental issues. Environmental-based education focuses on educational results: using the environment to engage students in their education through the "real-world" learning experiences, with the goals of helping them achieve higher levels of academic success as well as an understanding of and appreciation for the environment. (State Superintendent's Environmental Education Steering Committee, 2002, p. 7)
A History of Special Education

Throughout history, those individuals with a disability have not been treated equally. For example, throughout the Renaissance and Reformation, individuals with disabilities were tortured, killed, or placed in workhouses (Wood, 1998).

In the United States, attitudes toward individuals with disabilities have followed a similar pattern of development. Before 1850 there were few public provisions for children or adults with special needs. They were "stored away" in poorhouses and other charitable centers of left at home and given no educational opportunities. It was estimated that as late as 1850, 60% of the inmates of this country’s poorhouses were people who were deaf, blind, "insane," or "idiots." (Kirk, Gallagher, & Anastasiow, 1997, p. 45)

During the 1800s and into the 1900s, the industrial revolution created jobs and helped Americans focus on child abuse in factories and the fair treatment of all individuals. Reformers such as Horace Mann and Dorthea Dix established residential schools for American children who were deaf, blind and retarded. Blind and deaf children had institutions and schools long before the retarded. In 1896, the first class for special students was organized in Rhode Island. Since 1900, special programs and services have been provided in the public schools throughout the United States (Kirk et al., 1997).
The Civil Rights Movement during the 1960s promoted the call for basic rights of access to equal opportunities. The 1970s brought the normalization movement, which called for services for persons with mental retardation, to be more closely paralleled to the services of individuals without disabilities (Wood, 1998).

In 1973, Section 504 of the Rehabilitation Act (PL 93-112) prevented the exclusion of any person with a disability from vocational programs receiving federal funds. Section 504, although only a paragraph, had great impact for all persons with disabilities. It applied then and still applies today to all Americans with disabilities, regardless of age. Therefore, it applied to all children with disabilities, ages 3 through 22 years, with respect to their public education. In 1975, Congress passed PL 94-142, or the Handicapped Children Act. It was a federal landmark in legislation for education. It provided a free and appropriate education to all individuals with disabilities, and included many categorical labels for handicapped children (Wood, 1998).

Now handicapped students were mandated to receive free, appropriate education, in the least restrictive environment. During the 1980s mild/moderate handicapped students were placed within the regular education
classroom. During the 1990s the full inclusion movement advocated that all students attend the school they would otherwise attend if they were not identified as disabled or handicapped (Bauer & Shea, 1999).

In 1990, President George Bush signed PL 101-476 or Individuals with Disabilities Education Act (IDEA). This law brought many changes for the educational system. All references to handicapped were changed to disabilities. Autism and traumatic brain injury were added as categories of disabilities. Emotionally disturbed individuals were recognized as needing special education (Wood, 1998).

How to Educate the Special Education Student

With the legislation of the 1970s through the 1990s, administrators and teachers had to find methods of teaching the disabled or special needs child. In addition, federal law mandated that testing and assessment services must be fair and comprehensive. Placement in special education as opposed to general or regular education classes could not be under a single criterion, such as an IQ score (Levine & Ornstein, 1997).

In addition, new classrooms needed to be set up to accommodate the Learning Disabled (LD) students. The LD students had mild or learning disability; however, they
needed to be in a “pull-out” program. The “pull-out” program was developed to facilitate the “mild” student. The students would be taken from the classroom periodically to be given reading, math or other services to help bring them up to the grade level that they were currently attending. The students would be sent to a Resource Room to be tutored or educated by a special education teacher who would assist them during various periods of the day or during the week. Students with learning disabilities and those that were severely handicapped, as stated by law, were to be included with the general population. This meant that the student with the disability must be included in the regular classroom much or all of the school day. This was intended to facilitate the learning of the students with exceptional needs (Polloway, Patton, & Serna, 1997). Polloway et al. (1997) went on to state that during inclusion, peer tutoring and co-operative learning would help the students to learn. Co-operative learning is one way to facilitate learning through socialization.

Polloway et al. (1997) included the following quote by President Bill Clinton upon the signing of the IDEA (Individual with Disabilities Act) 1990, or Public Law (PL) 101-476:
Since the passage of the IDEA, 90% fewer developmental disabled children are living in institutions; hundreds of thousands of children with disabilities attend public schools and regular classrooms; three times as many disabled young people are enrolled in colleges and universities; twice as many young Americans with disabilities are in the American workplace...We have to continue to push these trends, to do everything we can do to encourage our children with disabilities... (p. 231)

Educators have the hope and the backing of our government; however, they do not have a national education system that dictates what the exceptional child will be taught. Kirk et al., in 1997, stated that the nature of special education is to provide exceptional children (another label of special, handicapped, or disabled students) with services not available to them in the regular education program. They went on to say that classroom teachers and typical educational programs simply cannot respond fully to the special needs of the exceptional child without a substantial change in the structure, program, and staffing of a typical classroom (p. 53).

Before a student's individualized program can be established, the goals of each student must be identified. In an Individualized Education Plan (IEP) meeting, the IEP team (administrator, parent, and teacher) agree what the
student needs to learn during the next year by setting goals (Kirk et al., 1997).

The classroom curriculum must include the goals of each student’s IEP. The teachers are to teach using the SEACO Curriculum Guide for Students with Significant Disabilities (California State Department of Education, 2005).

For example, if a teacher sets up a functional curriculum of personal life skills, including functional community skills and functional academic skills, the IEP goals written by the IEP team must develop goals that will help the student be successful. For the Trainable Mentally Handicapped (TMH) student, functional skills are the most appropriate to help the student grow into an adult who will be self-sufficient. Along with functional skills, basic academic skills continue to be the most widely used curricula (Polloway et al., 1997).

Educating the Special Education Student through Science

Through the basic skills curriculum, a teacher can teach letter recognition, reading, number recognition, and math. However, the teacher can also teach science (Cawley, 1994). Cawley stated that the use of science themes is
both a provocative and potentially powerful curriculum organizer.

Polloway et al. (1997) wrote that, for learners with special needs, a hands-on approach to science should stress the use of the process/inquiry skills more than the accumulation of substantive information. They underscored doing and discovery.

Mastropiere and Scruggs wrote in 1994 that most science teachers use science text books, and went on to add that scientific reforms in the world of the special education curriculum could interact with the characteristics of the students with disabilities. Characteristics that could be used were language or communication, conceptual, psychosocial, and physical-sensory characteristics. Active learning or a hands-on approach to science could give the special education students a platform on which to attach their accumulated knowledge.

Mastropiere and Scruggs (1994) selected four school districts and implemented two textbook series to be used with special education students. Each textbook series incorporated earth, life and physical science. If an activity-based approach was used, peer-instruction and cooperative learning method of instruction were be used to
help the disabled students to be included and to facilitate learning. Mastropiere and Scruggs (1993) found that students with learning disabilities who were exposed to activity-oriented science experiences performed better on follow-up unit testing than those students who used a textbook approach.

Doing or active learning has many advantages for the student with disabilities. Individualized education plans (IEPs) can include discovery or learning centers, small groups, an activity packet, or peer groups. All help to develop learning in the science programs (Turnbull & Schultz, 1979). Lee and Anderson (1997) wrote,

No matter how tightly a student's classroom behavior is controlled and guided by teachers and curriculum materials, students always retain personal control over their attention and effort. Thus effective science instruction must start with understanding the students' personal agendas, as well as their commitments, as well as their conceptions and learning process. Eventually, the success of science teaching depends on creating social bonds in which the teacher and the curriculum lead the students to identify the goal of scientific understanding as their own personal goal. (p. 724)

Educators are bound to teach special education students with the same state standards used by the general education teachers (Kirk et al., 1997). In arguments that oppose this law governing the education of the special
education student, IDEA stated that mainstreaming and inclusion help the handicapped or severe student to be in compliance with the law. Depending upon the social make-up of the setting, the general education classroom could be more restrictive (Rueda, Gallego, & Moll, 2000).

Therefore, with the implementation of a scientific curriculum, special education students would be able to be very much a part of a general education setting, by studying the same themes that their counterparts in the general education settings were studying. Rueda et al. went on to state that co-operative learning situations promote learning. They also stated “that to promote success, the classroom environment must be dense with occasions for authentic problem solving and communicating the process and products of problem solving” (p. 76). It is important to note that the emphasis on learning is the process, not the product.

With the implementation of any new curriculum, there is a lack of curriculum guide for subject areas. The teachers are expected to provide their own curriculum through their own resources (Long et al., 2002).

Since most severely handicapped students are unable to read, science textbooks would only be for reference for the teacher (Cawley, 1994; Falloway et al., 1997). The
State of California recommended that for science, the areas of concentrated study should be life, earth and physical science (Mastropiere & Scruggs, 1994). Polloway et al. (1997) stated that there were not many materials to teach science to handicapped students; however, there are a few very good programs. One program cited was Me and My Environment by Hubbard (Polloway et al., 1997).

Inquiry skills are beneficial for the new learner (or for the learner who has had difficulty learning), because the skills overlap into all areas of a student’s life. These processing skills are observation, measurement, classification, communication, organizational skills, inference (explaining an observation), prediction, data interpretation or finding patterns, formulating a hypothesis or making a guess upon what has been learned, and experimentation [or investigating] (Polloway et al., 1997). Inquiry skills may at first seem unmanageable to the layperson without a scientific background. However, when placed in layman terms, the skills can be translated into needed IEP goals (Polloway et al., 1997, p. 397).

"Because environmental education cuts across traditional curriculum barriers, many endorse the idea of using the environment as an integrated context for learning" (Haury & Milbourne, 2003, p. 34). Polloway et
also agreed by saying that science also lends itself to an integration of the entire curriculum. Environmental education covers the process skills outlined by Polloway et al. Examples are the use of the theme of marine biology with elementary students. The environment is a broad theme; however, all areas of the curriculum are incorporated by the environmental theme: reading, research, written expression, oral expression, spelling, math application, science, social studies or current world issues, visual arts, music, performing arts, and even computer skills.

Also suggested was co-operative learning as an effective strategy for handling the educational goals of the special education population. Included was a planning guide for the teacher (RCOE, 1994). Many of the activities were environmental in nature. The basic idea was to have the students discover and use the world around them.

Atwood and Oldham (1984) agreed that science was identified as the content area most amenable to the teaching of mainstreamed special education students.

Project Learning Tree (PLT), an environmental guide for educators, has stated that lessons and activities presented in its text are easily modified for the special needs student’s skills and abilities (American Forest
Foundation, 1994). Students are taught to develop critical thinking skills and creative problem solving skills by the use of the Project Learning Tree (PLT) lessons. The students are organized into cooperative learning teams that work together to accomplish academic tasks and non-academic tasks or functional skills while developing important social skills (American Forest Foundation, 1994).

In the lessons presented in the PLT manual, the levels presented for each lesson have variations. Lesson 21, "Adopt A Tree" (American Forest Foundation, 1994, p. 65) gives the activity as for grades 3 to 8. The variations presented show from pre-K for one variation and from K to 4th grade for the second variation. The variations have instructions for the gifted or enrichment programs and for the remediation (special education) programs.

Textbook manufacturers do not include the necessary resources to include the special needs student into the curriculum of the published texts. Parmar and Cawley (1993) stated that teacher's manuals studied at that time for science teaching were inadequate for the instruction of students with disabilities. They went on to say that the textbook developers, for the special needs student,
should supply lesson adaptations and supplementary activities. Mastropiere and Scruggs (1993) recorded that during an experiment to teach science to students with disabilities, many difficulties were discovered concerning mainstreaming activities (special education students learning the ability to mainstream into the classes with peers for short amounts of time during the school day, regardless of ability levels). The most significant problems noticed were with the text vocabulary. Also seen was poor behavior during loosely structured lessons, such as science labs. The researchers noted that in contrast to the content area approach, which they had been reported to be difficult for the handicapped student, the activity-based approach for learning science was preferable. This includes discovery, inquiry, or a constructive perspective.

Mastropiere and Scruggs also stated that, “some students with more severe disabilities are more typically educated in segregated special education environments” (1993, p. 17). They stated that inclusion (the insertion of the special education student into the general education classroom situations with or without instructional aide assistance) efforts were a better way
to prepare students for a high degree of independence for
the mild to moderate special education student.

Smith, Polloway, Patton, and Dowdy stated, "Cognitive
development for emphasizing active interaction with the
environment and concrete experiences can enhance students

Wood (1998) also stated that students with learning
disabilities require a curriculum that uses concrete
materials that are age-appropriate. Concrete materials
(realia-items that are real to the student) that the
student is able to grasp and retain when not in school.
Therefore, teachers should teach tasks or skills that the
student could apply when not in school to help the special
ed student generalize the knowledge obtained from the
classroom to their general lives. Tasks should be taught
so that they could be broken down into small steps. The
instructor must stress success, and the instructor must
provide prompt and consistent feedback.

Co-operative learning has been noted to help students
who are bilingual or learning English. In 1989, Calderon
wrote, "Substantial evidence suggests that students
working together is small cooperative groups can master
material better than students working on their own, and
that cooperative learning structures higher self-esteem and learning motivation" (p. 2).

By using co-operative teams in the classroom and letting the students employ their methods of discovery to build upon what they already know, the student learns without pressure (Rosenberg, O’Shea, & O’Shea, 1998).

Co-operative teams are able to incorporate at risk students. An at-risk student is a label that education has given to a broad spectrum of students. Desiano, Dill, and Raith, in a master’s thesis, in 1998, stated that an at-risk student is one that participates in a Resource Specialist Program (RSP), English Language Development (ELP) program, or a Special Education program. Desiano et al. noted that it was difficult to motivate the at-risk student in the areas of basic skills. Creative lesson plans and learning environments that satisfy the student’s emotional needs were required. Activities that promoted the student’s self-esteem and confidence were necessary to enable the students to try to take a risk at learning. Salend, in 1998, paraphrased Mastropiere and Scruggs concerning activity-oriented approaches, saying that a hands-on and multi-sensory approach to activities allowed students to actively explore and discover science content.
and minimize language and literacy demands that hinder students with language and learning difficulties.
CHAPTER THREE

THE RATIONALE FOR USING ENVIRONMENTAL EDUCATION

Stoner and Overbey wrote, in 1989

Environmental education in the curriculum does much more than enable the students to function now and in the future with an expanded awareness of themselves and their place in the world. Environmental education brings relevance to each child's learning, thus promoting successful schooling. (p. 146)

In order to set up a classroom for the needs of the curriculum for the school year, a teacher must use great ingenuity. Special teachers are not provided with a set curriculum, except related to teaching functional skills. They are expected to follow the state guidelines, incorporating a basic skills curriculum with age appropriate materials. They are not usually have not been provided with funds or teacher manuals. In order to be successful and compliant, this author has used the scientific method and incorporated environmental education.

Provided within, Project Learning Tree are activities for students of all ability level. Project Learning Tree provides an activity guide for bilingual students. The activity guide from Project Learning Tree has activities
for pre-kindergarten through eighth grade (American Forest Foundation, 1994).

Students also used Project WILD (Western Regional Environmental Education Council, 1994). Like PLT, Project WILD teaches across the curriculum or teaching reading, spelling, math, language arts, science and social studies. This approach provide another possibility when taking on a new area that will give the students a theme-based curriculum. Lessons are easily reconfigured to meet the need of special education students. By doing a task analysis, or by breaking lessons down into very basic steps, the most detailed and advanced lessons are easily used by students with special needs.

Environmental education is not only easy to implement, it sets the tone for a classroom theme. To facilitate the classroom theme, the usage of environmental-based literature carries the theme across the curriculum (O’Brien & Stoner, 1987). Wilson wrote in 1993 that reading children’s literature about the environment fosters a love of nature. Bowman wrote in 1979 that there were 101 activities for students to use to express themselves by using their senses during writing and speaking.
In keeping with the special education theory of building upon what one already knows, the constructivists believe that learning is a process of construction, much like stair steps. Howe and Warren in 1989 wrote that students must make choices daily. What better way to learn to make choices, than about things that they know about everyday. Learning builds upon previous knowledge, and that learning is closely related to a situation (Knapp, 1992).

Klein and Merritt (1994) suggested that environmental education and the constructivism theory of teaching are parallel. They wrote that the goal for an environmental educator is to assist learners of any age to develop awareness, knowledge, make good decisions, and be responsible for themselves.

Environmental education lends itself to the implementation in the special education curriculum and the use of a larger theme for the students to identify and remember their studies. Environmental education is concrete; it tells the truth. It displays the world around the student. The activities are reality based, where choice theory can become reality. The study of the environment provides hands-on experiences for the learner. This is a real life situation.
“Let’s Get Growing!” provides a source for garden products for classroom teachers. On the order form was a small place to order life lab skills scope and sequence and activity charts K-8 (Jaffe, 1994). They were free. After ordering, I received four booklets with so much information about all areas of the environmental curriculum, it was hard to resist. There were curriculum guides, unit planners, literature guides, songs, and a matrix’s on learning samplers complete for K-6th grade.

Covering the entire curriculum, through each subject is easy; Steidl (1993) published a book about past environmental heroes. The use of songs, activities, maps, and history are great ways to bring history alive.

The preceding are a few ways that an instructor may use EE to teach special education students. The connections will be easily made and remembered by the students.
When first beginning this study, this author’s ideas were very simple. The butterfly garden was nothing more that raising the butterflies from cocoons to free flight. The flowers planted for nourishment attracted so many students and staff members that the ideas began to branch out. A garden was included. Many classes began their own garden. All staff members on the campus wanted to be included. The feeling was that environmental education was a magnet for learning. Everyone wanted to be included in our field trips to farms, to pumpkin patches, to the Riverside Water Department, and to the nature classes.

The biggest awakening was when the severely emotionally disturbed students began using the class’s garden as a math lesson. No one was throwing a chair. The realization was that the environment was an equalizer. Students with very low IQ’s worked and learned next to students with severe problems and extremely high IQ’s. It is this author’s observation that the comfort level enabled the students to relax enough to learn any subject in the curriculum. In addition, the severely impaired students had ideas of what they were learning, because
they had prior knowledge of the world around them. This is a basic premise of the constructive theory of environmental education.

Nine classes worked in harmony, having monthly luncheons with produce grown on the site. Field trips with all classes were taken. The unifying factor was the use of environmental education.

The conclusion: the use of the environment was beneficial to all students. The use of the environment made learning easier, and as a result, all discriminations of students stopped! All students worked together; all staff and students worked as one. The harmony was contagious.

The recommendations that are obvious are the researched collection of data. Data were collected in the classroom, however, only as IEP collection data (i.e., following directions). The data that needed to be taken would be for the effectiveness of the environment education as compared to the direct teaching method. The results of the co-operative group verses the results of the direct teaching groups would be an interesting comparison. Another comparison that would be beneficial would be the use of a control group (non-environmental group) as compared to the environmental group. Other
recommendations are to use the science subset of the California content standards for students with significant disabilities (see Appendix C) and the CAPA Standards, as comparisons would be interesting. The bottom-line is that a series of data collections in the future would validate this author's observations.
APPENDIX A

LESSON PLANS
Lesson Plans

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TROUT LIFE CYCLE ...................................................................... 54
LESSON PLANS FORMAT

CAPA is the California Alternative Performance Assessment Test for all California special education students who are seven to 16 years old and non-diploma bound. The lesson plan format that is used here complies with the SEACO Curriculum Guide for students with significant disabilities in compliance with the No Child Left Behind Federal Mandate to have all students use the California content standards (California State Department of Education, 2005).

In addition, the SEACO Curriculum is a subset of essential standards from the California content standards for students with significant disabilities (California State Department of Education, 2005). The CAPA Test gives assurance that all students have access to the core curriculum.

Definitions of terms are listed in definitions section, Chapter One.
BUTTERFLY

CAPA STANDARD: Science Standard: Life Science 13-17

CAPA Level: 2-5

"FUNCTIONAL PERFORMANCE INDICATOR"/LEARNING OBJECTIVE:

The students will learn about their environment, learn to follow directions by growing butterfly flowers, tending the butterfly garden, and by observing the butterflies in the butterfly house in the classroom. Finally, by releasing the butterflies in the garden, the students will observe the animals in the garden.

VOCABULARY:
Butterfly, larva, chrysalis, cocoon, sugar-water, seeds, milkweed.

MATERIALS:
Butterfly flower seeds, Painted Lady butterfly larva, butterfly house, sugar solution, garden plot cleared, ready to plant, and a garden record book for recording plant growth (Jaffe, 1994).

PERSONNEL:
Teacher and all assistants

ANTICIPATORY SET:
The students have been counting and recording butterflies on the playground. They are ready to raise and nurture their own butterflies.

OBJECTIVE:
Students will see and begin to understand the circle of life.

INPUT:
The teacher shows students in groups and then again independently the life cycle cards of the butterfly. The teacher then begins to show students the way the butterflies will develop and stages of development by picture cards and real-life examples.

MODELING:
The teacher will soak the seeds and demonstrate how to plant the seeds. After ordering the butterfly larva, the larva is left alone to develop and hatch. After hatching and developing, the butterflies are let free into the garden.
CHECKING FOR UNDERSTANDING:
The students will plant the seeds and tend the garden. Data of the seeds growth will be kept in the student’s garden book two times per week. In addition, the students will hatch the development of the butterflies. They will record the growth of the butterfly’s development. We will record data of exactly what the student’s record and observe. The students are 6-10 years of age with IQ's of 40-65. Understanding will occur if the students are able to bridge the academic reality to the environmental observation. The circle of life or life cycle is the goal of the lesson.

GUIDED PRACTICE:
Students match picture cards of life cycle to examples of “real-life” in the classroom.

INDEPENDENT PRACTICE:
If the students are able to grasp the reality of the life cycle, the students will realize how the insects feed from the flowers as the butterflies develop and fly away to feed.

EVALUATION:
The student will record the growth information on teacher made charts. The students learned facts will be shown by the information on the charts. The lesson is a valuable life skills lesson.

ADAPTATIONS:
Visual - Charts for each type of plant show development of each plant. Auditory - Sign language used to explain lesson to hearing impaired. Kinesthetic - Students are encouraged to touch, plants (parts of plants), soil, roots, and flower. Students are encouraged to talk about differences in feelings of each part of each plant (comparison is also helpful).
A STUDY OF FALL

CAPA STANDARD: Math Standard 6; Science Standard 1

CAPA LEVEL 2-5

"FUNCTIONAL PERFORMANCE INDICATOR"/LEARNING OBJECTIVE:
The students will identify the colors, sizes, and relationship to the
parent trees of the leaves shed during the change of seasons.

VOCABULARY:
Leaves, patterns, colors: red, brown, yellow, green, verigated colors,
stem, and tree

MATERIALS:
The poem "Elf Man," real leaves of many colors and sizes, construction
paper of fall and summer colors and brass brads to secure the "Elf
Man" (pattern to follow).

PERSONNEL:
Teacher and all assistants

ANTICIPATORY SET:
Special Education students will learn about fall
By using the environment as a tool.
The use of a poem "Elf Man" will help to identify the colors of the fall
and to learn about the changes of the seasons.

OBJECTIVE:
The identification of fall colors: yellow, brown, orange, and review
summer colors of red and green.

INPUT:
The teacher and aids will need to help some students cut the leaves
out. The poem is to be written on the board for students to copy on the
back of the elf man.

MODELING:
The teacher will help the students identify the difference in the colors of
the leaves. The teacher will show photos of summer scenes with green
trees. Next the teacher will show the yellow, orange, red, and brown
leaves. She will ask the students what happened to the leaves and will
briefly explain why the leaves turn colors. The students will match the
colors of the construction paper leaves to the colors of the real fall
leaves.
CHECKING FOR UNDERSTANDING:
The students will match the Elf Man that is hanging on the board by making one themselves. The adults will secure the assembly by the brads provided. The students will copy the poem from the board and draw the face on the puppet.

GUIDED PRACTICE:
The students will stand at the front of the class, pointing out the colors of the fall leaves and reciting the poem.

INDEPENDENT PRACTICE:
If the students are able to grasp the reality of the life cycle, the students will realize how the insects feed from the flowers as the butterflies develop and fly away to feed.

EVALUATION:
The students should learn their fall colors and reason for leaves falling from tree. Each student should make a graph for the leaves found (5 red, 2 yellow, for example).

ADAPTATIONS:
Visual - making of elf puppet
Auditory - Sign language explanation
Kinesthetic - sensory integration methods need to be used as students show need.
ELF MAN

Elf man, Elf Man in a tree
Drop a pretty leaf on me
Orange, yellow, green and red
Drop a leaf right on my head

Author Unknown
Elf Man
GROWING WORMS IS FUN

CAPA STANDARD: Life Science 13, 14, 15

CAPA LEVEL: 2-5

"FUNCTIONAL PERFORMANCE INDICATOR"/ LEARNING OBJECTIVES:
Students know how to identify major structures common to plants and animals (stems, roots, arms, legs wings, eyes). Students know how to observe and describe similarities and differences in appearance and behavior of plants and animals.

VOCABULARY:
Body parts, eyes, worms, insects, casings, behavior, soil, mating.

MATERIALS:
Red wiggler worms (2 pounds), worm bin, newspaper, 2 cups sand, 2 cups water, and vegetarian scraps.

PERSONNEL:
Teacher and all assistants

ANTICIPATORY SET:
To help with the life cycle theme the students need to know how important worms are to the environment. To prepare for the lesson, the teacher must prepare the worm bin: using a large plastic storage box with an attached lid, drill holes into the sides and bottom of the bin. Tear long strips of newspaper, placing in the bin. Pour 2 cups sand over the paper. Pour 4 cups water over the paper--mix. The inside of the bin is dark. Pour 2 pounds of red wiggler worms into the bin (California Integrated Waste Management Board, 1996).

OBJECTIVE:
The students will be successful in applying knowledge of the life cycle to caring for the worms in the class worm bin. The students will care for the worms in the bin and use the worms and their casings in the garden to help their plants to flourish.

INPUT:
The student need to know and understand that worms are vegetarian. They are unable to have any oil or meat or dairy foods. Since we will be feeding the worms our leftover from lunch, the students must have a good understanding of this concept.
MODELING:
By having our food discussion, we have broken the class into groups. Each group is responsible for a specific time frame of the month. Food must be inspected and washed off before being fed.

Twice per week, the worm/newspaper ‘mixture’ needs to be turned. The worms like darkness; therefore, one must be careful not to harm the worms while turning them.

CHECKING FOR UNDERSTANDING:
The students need to understand that worms are their friends. The teacher makes a ‘worm puppet’ for each student by using an old sock and two buttons for eyes. The students wear the sock puppet and make up songs. By the third day of play-acting, almost all students will be accepting of touching a worm. The sock worms have a booklet that the students are able to draw in and write their made-up songs and poems. This may also used to keep any data collected.

GUIDED PRACTICE:
After feeding the worms, turning the paper mixture, the students notice that the worms are eating their new food and they are making new soil. The bin is quickly filling with soil. The students should carry this idea further and think to give the worms grass and fallen leaves. This concept may need to be prompted. In addition, the students may need to be prompted to remember to think about placing about one third of the worms in the class garden.

INDEPENDENT PRACTICE:
The student groups will continue to feed and nourish the worm bin. The same groups will tend the garden, and the worms will be used in the garden.

EVALUATION:
The students should understand how the worms eat. Each should take turns feeding worms and recording their experiences and feeling for future discussions.

ADAPTATIONS:
Visual - Make puppet to reduce fear of touching worm
Auditory - Sign language used to explain lesson to hearing impaired.
Kinesthetic - Touching worms, dispersing food into the bin (may need prompting).
The Worm Process

1. INTRODUCTION OF WORMS
2. WORMS ARE OUR FRIENDS
3. FEEDING AND CARING
4. WATCHING OUR FRIENDS GROW AND MAKE SOIL FOR THE GARDEN
My Very Own Worm Book

Name
The Worm Song

Nobody loves me
Everybody hates me
Guess I'll eat some worms
Long, slim, slimy ones,
Short, fat, juicy ones
Itsy-bitsy fuzzy-wuzzy worms.

Down goes the first one
Down goes the second one
Oh, how they wiggle and squirm
Long, slim slimy ones
Short, fat juicy ones
Itsy-bitsy fuzzy worms.

Up comes the first one
Up comes the second one
Oh, how they wiggle and squirm
Long, slim, slimy ones
Short, fat, juicy ones
Itsy-bitsy fuzzy worms.

Author Unknown
PRE-GARDEN PLANTING

CAPA STANDARD: Life Science 14

CAPA LEVEL 2-5

The Special Education students are divided into three groups for planting the class garden. The groups will be the sweet potatoes, the nasturtiums, and the carrots. The objective of the planting lesson is immediate and long range. The immediate objective is for the students to be ready to plant the class garden by learning the following terms: seeds, soil, light, (sun = energy), water, roots, stems, and leaves. The long-term goal is to plant and manage the garden. Past learning has yielded a garden; however, a yearly review is necessary to maintain a level of learning.

“FUNCTIONAL PERFORMANCE INDICTOR” / LEARNING OBJECTIVE:

The student will be successful in applying the knowledge of the life cycle of plants related to actual gardening experiences.

VOCABULARY:

Soil, seeds, stem, leaves, roots, water, sun, and energy.

MATERIALS:

Sweet potato suspended into water held up by toothpicks, carrot top placed into a saucer of water, nasturtium seeds, soil, cardboard egg carton cut apart into planting pots.

PERSONNEL:

Teacher and all assistants

ANTICIPATORY SET:

Explain to students where food comes from. Talk about plants growing in water and soil. Each student chooses the type of plant they wish to grow. The class is divided and learns how to grow the three types of plants on their team.

OBJECTIVE:

Students need to learn that food is grown, not found on a grocery shelf.

INPUT:

Due to many levels of the class, the students will be divided into teams with a variety of student levels on each team. The teacher will present the entire lesson to the whole group, then divide the class into previously decide groups.
MODELING:
Direct teaching for planting:
1. Sweet potato suspended in water, scrubbed carrot top and placed into a saucer of water. To introduce the lesson, a previously grown avocado seed with roots, stem, and leaves will be shown. (Introduce parts the plant and incorporate the vocabulary words being taught.) Diagrams drawn off the board and plant parts labeled match the garden booklets distributed to each student. The vocabulary will be reinforced in the student’s garden booklet.
2. Three planting styles will be demonstrated to each whole group. Each group of students will go to their stations and observe the modeling of each type of planting styles demonstrated by the teacher and aides.

CHECKING FOR UNDERSTANDING:
After the demonstration of planting, each group will plant their seeds or plants. Three sweet potatoes, three carrots, and many nasturtium seeds will be available for the students to plant. (This lets each student have a hands-on experience in planting.) The adult in charge will direct the students to name the parts of the plants from the avocado sample. As the time goes on the students will record the growth of the plants. The results will be recorded in the student’s garden book.

GUIDED PRACTICE:
Each adult will observe the student while the planting is taking place. The students will be asked daily, during the three-week time period, what the new vocabulary terms are, and the location of the plant parts. The students will also use the gathered measurements to record data for their garden books.

INDEPENDENT PRACTICE:
Each group will continue the planting with other seeds and plants. All plants will go into the prepared garden that the classroom has established.

EVALUATION:
Students should measure growth of plants and record discoveries in drawings. Students should explain findings to the group.

ADAPTATIONS:
Visual - Picture cards to explain parts of plants, plants suspended in water to show parts of plant
Auditory - Sign language used to explain lesson to hearing impaired.
Kinesthetic - Feeling all parts of lesson for prompting and explanation.
TROUT LIFE CYCLE

CAPA STANDARD: Life Science: 15, 16

CAPA: Level 2-5

"FUNCTIONAL PERFORMANCE INDICATOR"
Learning Objective: 16.4 Student will identify similar traits/characteristic of offspring to parent

KEY VOCABULARY:
Eggs, alevin, spawning, fry, salmon, trout, life cycle, camouflage, and habitat

MATERIALS:
80 gallon aquarium, refrigerated cooler (both provided by the California "Fly Fisher's Club"), trout eggs, fish food (also provided), purified water, 25 pounds of rocks, and Trout in the Classroom Curriculum (Higgins, 1996).

PERSONNEL:
Teacher and all Instructional Assistants

ANTICIPATORY SET:
In Southern California, the natural flow of streams is halted due to possible flooding. Therefore the Fish and Game Department of the state of California has banned together with various groups of Fly Fishing clubs to sponsor classroom raising of trout from eggs to fry (young adults). The concept is one of genius, the students learn responsibility, and the adults have a wonderful time and the entire groups get together for a day of "Fish Release" in the San Bernardino Mountains (Higgins, 1996).

OBJECTIVE:
The students will be successful in applying knowledge of the life cycle of animals in their habitat.

INPUT:
The teacher must participate in a mandatory day in-service of training to learn how to raise the trout eggs to the release stage.

To prepare for the lesson, the teacher does the preparation in front of the students to enable the students to have the full scope of the needs of the eggs.
The teacher needs to find and clean a great number of rocks for the fish to hide in while growing and gravel for the bottom of the tank. All must be sanitized. The aquarium is assembled, and the water is added. The water temperature must be kept at a constant 55 degrees. The eggs are in jeopardy of dying very easily. A great number of other steps must be taken in order for the eggs to mature.

This is an excellent activity for special education students of any age. The lessons of responsibility are there for all levels of student. In addition, teaching across the curriculum is easily adopted, including the standards for math and English (Higgins, 1996).

**MODELING:**

Once the tank has been set up, with the temperature set for a week, the students may begin measuring the eggs that hatch into alevins. They need to count the eggs that hatch, and remove the eggs or fish that die. Feeding with special food comes next. The students have a journal to keep their records in for the six-week duration.

**CHECKING FOR UNDERSTANDING:**

The groups will check on each other's data collection and the progress of their group's fish and their growth. Once the release day arrives, the students will need to tell the fly fisher's club the details of how the fish were raised before the release into the stream. The students will have knowledge of the fry's (fish ready to be released) diet and how the life cycle works in the fish's habitat.

The students will reflect the knowledge of the trout, their feeding development, from alevin to fry to adult trout at the fish release. The Trout Club members and the California Rangers will ask questions concerning the stations that they maintain for the students.

The Students will also receive instruction from the California Rangers at the release to learn the fish interaction with animals and insects in the wild (California Department of Education, 1993).

**GUIDED PRACTICE:**

The proof is shown at the release day. This day provides four to six hours of on the job training. The students will be quite excited to give the fishermen all the details of their fish friends. The fishermen and California Rangers "Quiz” and instruct the students on knowledge gained and new knowledge of the forest animals. The rangers bring live animals to the site many are endangered.
INDEPENDENT PRACTICE:
The project is too large for students to manage independently.

EVALUATION:
The students will repeat learned details to the members of the Fly Fish Club. The knowledge will be obscured and reinforced in the natural world.

ADAPTATIONS:
Visual - shapes of fish cutout and lined with lentils to let the visually impaired students know the shape of the fish.
Auditory - All the process will be signed with American Sign Language to enable the students understand all the process.
Kinesthetic - Students that need sensory integration need to feel all surfaces and feel that their surroundings are secure and comfortable.
TROUT LIFE CYCLE

Eggs develop in the gravel and hatch into alevins.

Alevins stay in the gravel. They get food from their yolk sacs and grow bigger.

After the yolk sac is used up, the tiny fish are fry. They swim out of the gravel to find food. They will live in gentle water near the stream bank until they get bigger.

As the fry grow stronger, they can take up positions in the main current of the stream. They eat insects and other small animals that live in, or fall into, the stream.

Adults often eat other fish, even smaller trout. Although they may live longer, trout do not grow as large as their relatives, the salmon and steelhead, because they don’t go out to sea.

Spawning trout lay eggs in gravel stream bottoms. Trout often spawn several times in their lives.

Some trout live in lakes. They may live there all their lives, but often spawn in streams.
APPENDIX B

RECOMMENDED READING
RELATED LITERATURE:

1. **Fantastic Mr. Fox**  
   Dahl, Roald  
   Puffin Books, 1970  
   illustrated by Tony Ross  
   Primary  
   A very smart fox protects the entire valley from three cunning farmers. Very funny! The environment that the animals live in is vividly written about.

2. **Baboon Family**  
   Goodall, Jane  
   Madison Books 1991  
   Primary  
   A factual account of the life of a young baboon and the way he and his family live. Their world is documented by word and photographs.

3. **Rosie’s Walk**  
   Hutchins, Pat  
   Macmillan Books, 1971  
   Primary  
   Rosie the hen goes on a walk through her world. A fox is after the hen, but the hen is smarter than the fox. A delightful tale for the young that will give many questions about the hen’s world a chance to be asked.

4. **Wonders of the Forest**  
   Sabin, Francene  
   Troll, 1982  
   illustrated by Michael Willard  
   Primary  
   A beautiful account of the forest and the animals that live in the forest. The seasons are represented, along with the way of life. This is a factual book that young children will enjoy, because it appears as a story.
5. **Wonders of the Pond**  
Sabin, Francene  
illustrated by Leigh Grant  
Troll, 1982  
Primary  
A factual account beautifully shown by watercolors, that describes the way of life in a pond. The fish, worms, insects, and reptiles are described, along with their environment.

6. **Wonders of the Desert**  
Sabin, Louis  
illustrated by Pamela Ford  
Troll, 1982  
Primary  
Factual books written to describe the way animals live in the desert. Their environment is beautifully drawn to explain the animals’ environment.

**PICTURE BOOKS**

1. **Butterfly Alphabet**  
Sandved, Kjell  
Scholastic, Inc. 1996  
Pre kindergarten to intermediate  
Close up photos of butterflies yields a true delight.

2. **Chris Just A Dream,**  
Van Allsburg  
Houghton Mifflin 1990  
Primary  
A young man has a dream that could be reality: the environment belongs to everyone.

3. **Drac and the Gremlin,**  
Bailie, Allan,  
Dial Books 1989  
Primary  
A young girl and her friend play a game, and their environment helps to complete the fantasy.
4. **Eyes of the Grey Wolf**,  
London, Jonathan  
Chronicle Books 1993  
Primary  
Even in the frozen night, a lone wolf finds the need for food and friendship. All of nature is intertwined.

5. **Willie's Wonderful Pet**  
Cebulash, Mel  
Scholastic 1972  
Primary  
It's pet day at school. Willie has a great pet that helps us all.

6. **The Snow Tree**,  
Repchuk, Josephine  
 Templar 1996  
Primary  
A beautifully illustrated book about a young bear's search for color. All of nature helps him to find a treasure.

7. **The Rain Forest**  
Cowcher, Helen  
Scholastic 1988  
Primary  
The rain forest animals are being threatened by man and his machines.

8. **Dear Children of the Earth**,  
Schimmel, Schim  
North Word Press, Inc. 1996  
Primary  
Mother Earth has written a remarkable message to the children of the earth asking for their help and their love.

9. **Miss Jaster's Garden**,  
Bodecker, M. M.  
Golden Press 1972  
Primary  
There is a very special friend living in Miss Jaster's garden.

10. **The Very Hungry Caterpillar**,  
Carle, Eric
A wonderful caterpillar finds her way in the world by eating and making the world a very special place.

Folklore:

1. The Wonderful Tree,
Holt, Adelaide
Golden Press 1974
Primary
A grandfather shares the story of the earth’s glorious seasons with his grandson by way of a pear tree in the orchard.

Historical Fiction:

1. When the World Was Young
Ginn Text Book
Fourth Grade Reader
Fictional stories in a fourth grade textbook.

2. Tree in the Trail,
Holling, Clancy
Houghton Mifflin 1972
Primary
A wonderful story of the adventures of discovery that a tree is able to share.

Nonfiction Information

1. Wonders of the Season,
Brandt, Keith
Troll 1982
Primary
A year in the life of the earth’s journey around the sun. A good account to combine with other stories to relate facts about the seasons.
2. **How the Forest Grew**,  
Jasperson, William  
Scholastic 1980  
Primary  
A wonderful account of the growth of a hardwood forest and the animals that live in it. This book could be a reference book, a reading book for second graders, or a pleasure book for knowledge.

3. **Nature Hide and Seek**  
Woods and Forest  
John Norris Reading’s Fun 1993  
Primary  
A picture book that is accurate, detailed, and inviting.

4. **The Big Bug Search**  
Young, Caroline  
Usborne 1996  
Primary  
A book that is factual and entertaining. It is filled with facts concerning the insects of the world and their environment.
APPENDIX C

SCIENCE SUBSET OF THE CALIFORNIA CONTENT STANDARDS FOR STUDENTS WITH SIGNIFICANT DISABILITIES
SCIENCE
Subset of the California Content Standards
For Students with Significant Disabilities

PHYSICAL SCIENCE

Descriptive Statement: The concepts of force and motion are important in the completion of most tasks in everyday life. Learning to use energy efficiently and safely can increase productivity, promote access to recreational activities and develop skills in personal care.

<table>
<thead>
<tr>
<th>Science Standard 7</th>
<th>Students know objects fall to the ground unless something holds them up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Science</td>
<td></td>
</tr>
<tr>
<td>Second Grade - 1.e</td>
<td></td>
</tr>
<tr>
<td>CAPA Levels 1-5</td>
<td></td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Explore gravity by causing different objects to fall (e.g., feather, balloon, ball, etc.)

2. Follow receptive instructions to drop different objects to the ground

3. Hold object and release upon request

<table>
<thead>
<tr>
<th>Science Standard 8</th>
<th>Students know the way to change how something is moving by giving it a push or a pull. The size of the change is related to the strength or the amount of force of the push or pull.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Science</td>
<td></td>
</tr>
<tr>
<td>Second Grade - 1.c</td>
<td></td>
</tr>
<tr>
<td>CAPA Levels 1-5</td>
<td></td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Roll a ball, push a toy car

2. Push an object/switch

3. Pull an object/switch

4. Identify 2 amounts of force, such as pushing a ball lightly or harder to make it move

5. Pull a door open/closed

6. Push a door open/closed

7. Indicate whether an action is a push or pull

8. Use push/pull motion to operate a tool or equipment (e.g., push a broom/vacuum)
SCIENCE
Subset of the California Content Standards
For Students with Significant Disabilities

Science Standard 9
Physical Science
Kindergarten - 1.a
CAPA levels 2-5
Students know objects can be described in terms of the materials they are made of (e.g., clay, cloth, paper) and their physical properties (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, floating, sinking).

Functional Performance Indicators:
1. Manipulate flexible objects (e.g., GAK, playdough, rubber bands)
2. Identify the color of an object
3. Identify the size of an object
4. Identify the shape of an object
5. Identify the texture of an object
6. Identify the weight of an object (e.g., heavy/light)
7. Identify what material(s) an object is made of
8. Describe one property of a given object/picture
9. Describe 2 properties of a given object/picture
10. When given 2 common objects, describe the common properties
11. Identify/demonstrate the floating and sinking of objects
12. Use magnets to move an object

Science Standard 10
Physical Science
Kindergarten - 1.b
CAPA levels 2-5
Students know water can be a liquid or a solid and can be made to change back and forth from one form to the other.

Functional Performance Indicators:
1. Identify ice cube/water
2. Identify that a melted ice cube is now water
3. Demonstrate how water changes from one state to another (e.g., putting ice cube tray filled with water into the freezer)
4. Identify/label solid form of water and liquid form of water
5. Identify environmental sources of solid and liquid water (e.g., rain, hail, snow)
SCIENCE
Subset of the California Content Standards
For Students with Significant Disabilities

<table>
<thead>
<tr>
<th>Science Standard 11</th>
<th>Students know the properties of substances can change when the substances are mixed, cooled or heated.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Science</td>
<td></td>
</tr>
<tr>
<td>First Grade - 1.b</td>
<td></td>
</tr>
<tr>
<td>CAPA levels 2-5</td>
<td></td>
</tr>
</tbody>
</table>

**Functional Performance Indicators:**

1. Identify difference between hot and cold

2. Identify that substances can change from hot to cold, solid to liquid and vice versa

3. Follow a simple no-bake cooking recipe (e.g., cheesecake, no bake cookies, instant pudding)

4. Follow a simple heated recipe (e.g., Easy Mac, refrigerator/pull-apart cookies)

5. Follow simple mixing and cooking recipe (e.g., jello, cake mix, pancakes)

6. Describe what happens when two substances are mixed together (e.g., vinegar and baking soda, plaster and water)

<table>
<thead>
<tr>
<th>Science Standard 12</th>
<th>Students know the position of an object can be described by locating it in relation to another object or to the background.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Science</td>
<td></td>
</tr>
<tr>
<td>First Grade - 1.a</td>
<td></td>
</tr>
<tr>
<td>CAPA levels 2-5</td>
<td></td>
</tr>
</tbody>
</table>

**Functional Performance Indicators:**

1. Indicate the relative position of an item by use of preposition(s) (e.g., next to, in front of, behind)

2. Execute a simple positional direction

3. Identify where student is in relation to another object or background

4. Use one landmark on campus or in community to reach given destination

5. Use more than one landmark on campus or in the community to reach given destination
SCIENCE
Subset of the California Content Standards
For Students with Significant Disabilities

LIFE SCIENCE

Descriptive Statement: Life on earth is complex and diverse. Students should know about the different kinds of life on earth, how living things depend on each other and how they change over time.

Life on earth is interdependent. Learning how to take care of personal needs can enhance independence. Learning how to care for other living things can increase self-confidence and develop responsibility.

<table>
<thead>
<tr>
<th>Science Standard 13</th>
<th>Students know both plants and animals need water, animals need food and plants need light.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Science</td>
<td></td>
</tr>
<tr>
<td>First Grade - 2.b</td>
<td></td>
</tr>
<tr>
<td>CAPA Levels 1-5</td>
<td></td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Identify animals
2. Identify plants
3. Sort animals from plants
4. Match animals to their appropriate food source
5. Identify appropriate habitat for a specific animal
6. Identify appropriate lighted habitats for a specific plant (e.g., shade vs full sun)
7. Care for a plant
8. Care for an animal
9. Plant a seed/seedling and observe its growth

<table>
<thead>
<tr>
<th>Science Standard 14</th>
<th>Students know both plants and animals need water, animals need food and plants need light.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Science</td>
<td></td>
</tr>
<tr>
<td>Kindergarten - 2.c</td>
<td></td>
</tr>
<tr>
<td>CAPA Levels 2-5</td>
<td></td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Identify body parts on self
2. Identify animal body parts
3. Match animal body parts (same to same)
4. Match structures of a plant (stem, leaf, etc.)
5. Draw an animal with some body parts
6. Draw a plant with some plant structures
SCIENCE
Subset of the California Content Standards
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<table>
<thead>
<tr>
<th>Science Standard 15</th>
<th>Students know how to observe and describe similarities and differences in the appearance and behavior of plants and animals (e.g., seed-bearing plants, birds, fish, insects).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Science</td>
<td></td>
</tr>
<tr>
<td>Kindergarten - 2.a</td>
<td></td>
</tr>
<tr>
<td>CAPA Levels 2-5</td>
<td></td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Match animal same to same (e.g., bird to bird)
2. Identify the classifications of animals (e.g., birds, reptiles, mammals)
3. Sort animals into classifications
4. Sort animals by different attributes (e.g., fur, feathers, scales)
5. Sort plants ‘fly different attributes (e.g., color, flowering, evergreen, cactus, etc.)
6. Identify similarities/differences among animals (e.g., domestic versus wild animals)
7. Identify similarities/differences among plants (e.g., edible versus non-edible plants)
8. Identify characteristics of a pet animal (e.g., what it eats, how active it is, when it sleeps)

<table>
<thead>
<tr>
<th>Science Standard 16</th>
<th>Students know that organisms reproduce offspring of their own kind and that the offspring resemble their parents and one another.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Science</td>
<td></td>
</tr>
<tr>
<td>Second Grade - 2.a</td>
<td></td>
</tr>
<tr>
<td>CAPA Levels 2-5</td>
<td></td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Match same to same parent
2. Match same to same offspring
3. Match offspring to parent
4. Identify similar traits/characteristics of offspring to parent
5. Identify stages in the life cycle of an animal/plant
6. Sequence the life cycle of an animal/plant

<table>
<thead>
<tr>
<th>Science Standard 17</th>
<th>Students know there is variation among individuals of one kind within a population.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Science</td>
<td></td>
</tr>
<tr>
<td>Second Grade - 2.d</td>
<td></td>
</tr>
<tr>
<td>CAPA Levels 2-5</td>
<td></td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Identify variations in the physical attributes of individuals/animals/plants (e.g., color, height, size, etc.)
2. Match variations in the physical attributes of individuals/animals/plants
3. Sort according to variations in the physical attributes of individuals/animals/plants
SCIENCE
Subset of the California Content Standards
For Students with Significant Disabilities

EARTH SCIENCE

Descriptive Statement: Weather is a constant and ever changing force. Students should know about different kinds of weather and different environmental conditions and respond appropriately for comfort.

<table>
<thead>
<tr>
<th>Science Standard 18</th>
<th>Students know changes in weather occur from day to day and across seasons, affecting Earth and its inhabitants.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth Science</td>
<td></td>
</tr>
<tr>
<td>Kindergarten - 3.b</td>
<td></td>
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<tr>
<td>CAPA Levels 1-5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Science Standard 19</th>
<th>Students know that the weather changes from day to day but that trends in temperature or of rain (or snow) tend to be predictable II during a season.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth Science</td>
<td></td>
</tr>
<tr>
<td>First Grade - 3.b</td>
<td></td>
</tr>
<tr>
<td>CAPA Levels 1-5</td>
<td></td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Match pictures of weather to same
2. Identify various kinds of weather
3. Identify weather descriptors (e.g., temperature, precipitation, wind, etc.)
4. Categorize appropriate clothing according to weather conditions
5. Categorize various weather conditions to specific seasons (e.g., snow to winter)
6. Record daily weather conditions to show weather trends
7. Dress appropriately for different weather conditions
8. Use weather prediction to determine what to wear to School/work
### SCIENCE

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For Students with Significant Disabilities

<table>
<thead>
<tr>
<th>Science Standard 6</th>
<th>Describe the properties of common objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation &amp; Experimentation</td>
<td>Kindergarten - 4.b</td>
</tr>
<tr>
<td>CAPA Levels 2-5</td>
<td></td>
</tr>
</tbody>
</table>

**Functional Performance Indicators:**

1. Identify the color of an object
2. Identify the size of an object
3. Identify the shape of an object
4. Identify the texture of an object
5. Identify the weight of an object
6. Describe one property of a given object/picture
7. Describe 2 properties of a given object/picture
8. When given 2 common objects, describe the common properties
### SCIENCE
Subset of the California Content Standards
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<table>
<thead>
<tr>
<th>Science Standard 3</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation &amp; Experimentation Kindergarten - 4.e</td>
<td>Communicate observations orally and through drawings</td>
</tr>
</tbody>
</table>

**Functional Performance Indicators:**

1. Draw simple picture (e.g., house, happy face, etc.)
2. Label objects/pictures presented
3. Use pictures/symbols to express observations

<table>
<thead>
<tr>
<th>Science Standard 4</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation &amp; Experimentation Kindergarten - 4.c</td>
<td>Describe the relative position of objects by using one reference (e.g., put on, in, above or below)</td>
</tr>
</tbody>
</table>

**Functional Performance Indicators:**

1. Follow simple positional receptive instruction (e.g., put water in bowl)
2. Position objects by using one reference (e.g., in, on, above, etc.)
3. Describe the positions of 2 differently placed objects
4. Describe the position of an object in relation to another object in the environment

<table>
<thead>
<tr>
<th>Science Standard 7</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation &amp; Experimentation Second Grade - 4.c</td>
<td>Compare and sort common objects according to two or more physical attributes (e.g., color, shape, texture, size, weight).</td>
</tr>
</tbody>
</table>

**Functional Performance Indicators:**

1. Sort 2 different types of animals or objects (e.g., dogs, cats)
2. Sort objects by color and shape
3. Sort objects by shape and texture
4. Sort objects by size and weight
5. Compare and describe similarities of 2 specific objects
Descriptive Statement: The skills of asking meaningful questions and conducting careful investigations are important in the completion of most tasks in everyday life. Students will be able to - compare, sort, observe, communicate and describe objects leading to developing their own questions and performing investigations.

<table>
<thead>
<tr>
<th>Science Standard 1</th>
<th>Compare and sort common objects by one physical attribute (e.g., color, shape, texture, size, weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation &amp; Experimentation</td>
<td>Kindergarten - 4.d CAPA levels 1-5</td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Attend to two or more presented unlike objects
2. Match two like objects
3. Sort objects by color
4. Sort objects by shape
5. Sort objects by texture
6. Sort objects by size
7. Sort objects by weight
8. Describe one common attribute between two objects

<table>
<thead>
<tr>
<th>Science Standard 2</th>
<th>Students know objects fall to the ground unless something holds them up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation &amp; Experimentation</td>
<td>Kindergarten - 4.a CAP A levels 1-5</td>
</tr>
</tbody>
</table>

Functional Performance Indicators:

1. Smell various scents
2. Taste different textures/foods
3. Attend to visual material
4. Attend to sounds
5. Explore textures
6. Explore and describe types of scents/flavors/sights/sounds/textures
7. Show preference for scents/flavors/sights/sounds/textures
REFERENCES


Bowman, M. (1979). Teaching basic skills through environmental education activities. (ERIC Document Reproduction Service No. ED 077696)


