THE SEARCH AND REVIEW OF ELEMENTARY MARINE EDUCATION MATERIALS

Jeanne M. Liu
Wendy B. Allen

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THE SEARCH AND REVIEW OF ELEMENTARY MARINE EDUCATION MATERIALS

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We wish to thank Alice Linder, Environmental Education Consultant, South Carolina State Department of Education and Will Hon, Marine Education Specialist, University of Georgia Marine Extension Center, for their support and willingness to let us "roam" through their vast collections of marine education materials. We also appreciate the cooperation of those who responded to our inquiry, sent us information and free materials and expressed an interest in and support for this endeavor.
INTRODUCTION

The coastal areas, rivers, and lakes of South Carolina are of importance to the economic and recreational well-being of its residents. The understanding of ecological concepts, relationships, and information underlying the use and abuse of these environments is an interest and concern of many educators and a program objective of many marine-related agencies and institutions in the state.

A recent statewide survey of teachers (grades K-12) was conducted by the South Carolina Department of Education to obtain teacher perceptions regarding environmental education needs and problems. This needs assessment resulted in the identification of three major problem areas: (1) many teachers lack an awareness of the need for marine and aquatic education, (2) teachers lack suitable instructional materials, and (3) few environmental education training programs are available.

In addition, a cursory nationwide survey of marine education programs indicated the existence of many highly developed high school programs but relatively few elementary marine education programs.

The purposes of this seed project were to search, obtain and review elementary (K-6) marine educational programs and materials in a comprehensive manner. The findings of the review provide information that can be used in the preliminary design phase of South Carolina marine education program development efforts.

The search process is detailed in Part I of this report. Search methods are described and the numbers and types of responses to letters of inquiry are
presented and discussed. Part II contains descriptions of the review process and components of the review format. Part III includes the reviews of individual project units and Part IV presents summaries and discussions of review findings.

Every effort was made to identify and obtain copies of existing elementary marine education project materials. We believe that the overall sample of materials obtained and reviewed is not only representative but also comprises a very large portion of the existing materials of this type. Due to the limitation of time, only programs and organized series of infusion units were reviewed. Individual units and supplementary materials were excluded from the review process.
PART I: THE SEARCH PROCESS

A nationwide search for marine and aquatic curricular and instructional materials for students in kindergarten through grade 6 was conducted over a four month period. Five search methods were employed and are described below.

A. Direct Mailing

Letters which explained the project and the types of information and materials being sought were mailed to a total of 141 organizations and individuals. A copy of this form letter is included in Appendix A.

The 141 organizations and individuals represented five of the carefully selected target groups below:

1) Appointed state marine education coordinators in the Sea Grant education network
2) Sea Grant Institutions/Consortia
3) Marine/aquatic agencies and organizations from Virginia, North Carolina, South Carolina, Georgia and Florida (a regional component)
4) Federal agencies with marine/aquatic interests
5) Private, non-profit organizations with marine/aquatic interests located outside the Southeastern region

A sixth category, "other" was created to accommodate schools, agencies and organizations that had developed materials which did not fit into any of the other five categories. The number of letters sent to each of the target groups and the number and percentage of the responses are presented in Table 1.

-----------------------------
Insert Table 1 about here
-----------------------------

The data above indicate that of a total of the 51 replies (36%) received, the
responses were greater from "other" agencies and marine/aquatic organizations than from state and federal agencies with marine/aquatic interests. All responses and ordering information were recorded on a form (see Appendix B).

In order to describe the kinds of responses and the types of available materials indicated, six categories were established. The first four represent responses related to particular types of marine educational material (e.g., programs, objectives, units or supplementary brochures, booklets, etc.). The fifth category refers to responses which represent personal recommendations or references to marine educational material developed by others. Finally, a sixth category was added to the original form to represent responses regarding the lack of available marine/aquatic materials. Table 2 presents the number of types of responses by the six target groups identified previously.

Insert Table 2 about here

The information in Table 2 indicates that relatively few elementary marine education programs were reported available as compared with large numbers of other types of educational materials such as instructional units and other supplementary materials. Sea Grant Institutions or Consortia reported the availability and/or knowledge of more marine educational materials than any other target group. Also, it appears that many of the programs, units and supplementary marine materials have been developed by or in conjunction with Sea Grant institutions. Moreover, the data in Table 2 indicate that very few materials have been developed at the state level. A number of materials, however, have been developed by local county school districts and environmental education centers.
B. Bibliographies

Three different bibliographies were consulted and provided additional information regarding available elementary marine education materials. These sources are listed below:


C. Computer Searches

The National Sea Grant Depository in Rhode Island conducted two computer searches. Relevant materials were selected from the computer print-out lists and borrowed from the Depository. A Marine Education Materials System (MEMS) search was conducted by the Marine Education Center in Virginia. Pertinent materials were reviewed from this collection. An Educational Resources Information Center (ERIC) search of marine education materials was conducted by the State Department of Education and findings were utilized during the search process.

D. Personal Collections of Materials

Materials that had been amassed over several years by certain educators were
also consulted in this project. These materials were either borrowed or reviewed on-site.

E. Direct Contacts by Telephone

References to other individuals and organizations were often made by people who responded to the letter of inquiry. Some of these individuals and organizations were contacted by telephone to expedite the search process.

The materials collected for review were obtained in several ways. Some materials were sent, free of charge, by the organization or agency that had developed them. Other materials were purchased or borrowed as a result of responses to the letters of inquiry, computer searches, or contacts with people who had collections of marine educational materials.

In summary, each of the methods employed during the search provided useful information. No one method alone would have generated the types and quantities of information which were sought for the purposes of this project.

The direct mailing approach yielded information regarding the national extent of marine/aquatic education for students in grades K-6 and provided ordering information for much of the available materials. Bibliographies referenced additional contact people and publications that were not identified in the responses to the direct mailings. The computer searches and loan services were particularly valuable for locating and obtaining out-of-print publications and more recent publications that were ordered but not likely to be delivered before this project terminated. Private collections also enabled the review of out-of-print publications and additional materials which did not surface with other search methods. Direct contacts by telephone expedited the search
and ordering processes for some materials. Overall, the direct mailings yielded the greatest amount of desired information while the other search methods produced further information which filled gaps and facilitated the search for specific materials within the limited time period of this project.

"Marine Education Resources for Educators" (see green pages, Appendix C), a collage of resource people, systems and programs is a product of the search process. This document was designed to facilitate further search and communication efforts.
PART II: THE REVIEW FORMAT

A format was developed to assist the reviewers in characterizing program and unit components (see pages 9-12). Each component in the format will be discussed. Specific characteristics which are not self-explanatory will be clarified, important characteristics will be noted and discussed further, and a general rationale will be presented.

A. Basic Project Information

Basic information about the project and its respective materials is presented in the first portion of the format. The copyright date or development date is stated in this section. The materials are classified as one of three general types: program, infusion unit, or activities.

For the purpose of clarity, a "program" is a series of instructional units purposefully developed around a sequential, spiraling, conceptual curricular framework. Each unit builds on concepts developed in previous units. Thus, intended outcomes of the program reflect simple to complex learning (e.g., organisms to ecosystems). Units in a program are often an integral part of the elementary science curriculum. Also, programs are usually developed at the county/school district level and teachers are often required to implement units of the program as a regular part of their science program.

"Infusion units" are instructional units on related but not necessarily sequential topics or concepts. Thus, each unit can be implemented separately; learning in one unit is not dependent on learning in other units. Infusion units are often implemented on a voluntary, supplementary and/or interdisciplinary basis.

"Activities" refers to a series of loosely related instructional activities on various topics. Teachers almost always use these on a voluntary basis as supplementary activities. Awareness rather than purposeful learning is often the reason for using these materials.
1. PROGRAM CHARACTERISTICS
   - Program information
   - Program goals and objectives
   - Field-tested units and activities
   - Inservice training for teachers

2. UNIT CHARACTERISTICS

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A. **Content (stated inferred)**

organisms, life cycles
habitats, environmental factors, adaptation
communities
ecosystems (concepts, relationships)
water properties
marine/aquatic geology, geography
interaction of people with marine/aquatic environments
ocean fronts/beaches/ sand dunes
estuaries/salt marshes
rivers/swamps
lakes/ponds
### B. Skills (stated inferred)

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- observing (all senses)
- identifying, classifying
- measuring, quantifying
- questioning, hypothesizing
- inferring, analyzing, interpreting
- summarizing, concluding
- designing experiment, controlling variables
- describing, communicating
- manipulating
- cooperating in groups

### C. Teacher Material Characteristics

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- instructional objectives: awareness, learning, affect
- student learning performance criterion
- teacher background information
- glossary of terms/concepts
- student prerequisites
- lesson preparation information
- lesson plans: highly implicit, highly explicit
- classroom management information
- references to community/other resources
- follow-up/enrichment activities
- methods for integrating content with other subject areas
- methods for implementation with special students

### D. Student Material Characteristics

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- objectives
- information: prose, pictorial
- reading level appropriate
- activity/lab sheets (in teacher's guide, purchase separately)
- attractive
### E. Equipment/Materials

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- Home-made
- Locally obtainable
- Specialized, must be ordered
- Live organisms
- Packaged kits with program

### F. Assessment Materials and Characteristics

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- Unit effectiveness questionnaires
- Written tests: pretest, posttest
- Student attitude questionnaires
- Large group discussion
- Small group discussion/demonstration
- Individual projects/performance
- Suggestions in the teacher's guide
- Answers or evaluation criteria

### G. Instructional Modes

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- Teacher lecture, presentation
- Teacher demonstration
- Teacher/student discussion
- Audio-visual presentation
- Quiet reading for students
- Written seatwork
- Activities with concrete materials
- Student experimentation
- Simulation games
- Other instructional games
- Field experiences (pre-planned/to be planned by teacher)
H. Relationships Among Instructional Objectives, Instruction and Assessment

The instructional objectives and the unit components below can be described as:

1 not related
2 vaguely related
3 somewhat related
4 highly related

K 1 2 3 4 5 6

- - - - - -

content/skills of the instruction

- - - - - -

assessment items

COMMENTS:
B. Program Characteristics

In Part 1, four program characteristics provide important information regarding the development and implementation of the program. A check mark (✓) in front of a program characteristic indicates the presence of the characteristic. Field tests of units, activities, and assessment items provide information for revision and baseline data regarding student learning. If a decision is made to adopt a program in its entirety, the availability of inservice training for teachers is a critical factor for implementing the units effectively.

C. Unit Characteristics

The grade level of each unit is indicated in the "materials" section of the basic information portion of the format. Each unit is reviewed separately and the information regarding presence of particular unit components and characteristics (Sections A-G) is indicated by a darkened oval in the appropriate level column.

2. UNIT CHARACTERISTICS

<table>
<thead>
<tr>
<th>K</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>A. Content [✓stated ✓inferred]</th>
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<td>organisms, life cycles</td>
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</table>

In the example above, the darkened ovals in columns K, 1, and 3 indicate that content involving "organisms," and/or "life cycles" is present in the kindergarten, first and third grade units.

If a unit spans more than one grade level, then a column number will be assigned in the basic information portion of the format simply to identify the unit. In this case, the number will indicate only an appropriate grade level of the unit.

Part 2 begins with the classification of "content" (Section A) and "skills"
(Section B) to be learned by the student. Both content and skills are basic components of well-stated instructional or behavioral objectives. If objectives or lists of concepts or skills are not stated then the content and skills are inferred by the reviewer from instructional activities. Sometimes, objectives are stated but the unit contains some activities which are not directly related to the objectives. If this is the case, then both "stated" and "inferred" descriptions are checked. The lists of concepts and skills in both these sections are typical of those present in well-developed elementary science programs.

"Teacher material characteristics" are described in the Section C, in Part 2. A few comments must be made, at the outset, regarding the importance of well-developed teacher materials. Many elementary teachers are not well-prepared to teach science. Furthermore, marine/aquatic content is not usually included in science methods courses in pre-service teacher education programs. Thus, teacher materials which possess a larger proportion of the characteristics listed are often deemed more desirable since they provide the kind of information and inservice "training" which facilitates more effective implementation of the units. The specificity and structure of the materials play an important role, especially if the goal of the units is to enhance student learning. Instructional research, development, and evaluation support findings, for example, that clear statements of instructional or behavioral objectives enhance student learning. The classification of "instructional objectives" into types (i.e., awareness, learning, affect) provides information which forms the context for users of this report to evaluate the materials. For example, if "learning" is the underlying purpose of the unit, then the first eight teacher material characteristics are critical instructional qualities which assist the teacher in enhancing student learning. The presence of a "student learning performance criterion" (e.g., 80% correct answers on a post test) provides some mechanism for judging
the adequacy of the learning and, consequently, the effectiveness of the instructional materials. "Teacher background information," "glossary of terms and concepts," "lesson preparation information," "explicit lesson plans," and "classroom management information," provided in the teacher's guide, bridge the gap between the frequent lack of teacher training in science and enhance the likelihood of higher quality marine education instruction for students.

"Methods for integrating (marine/aquatic) content with other subject areas," such as language arts, social studies, art, etc., encourage teachers to treat marine education as an interdisciplinary endeavor. Such an interdisciplinary approach emphasizes relationships between people and their marine/aquatic environment and facilitates the development of positive attitudes toward marine/aquatic environments and the concern for solving marine/aquatic problems.

"Student materials," another unit component, includes four basic characteristics. First, the direct statement of "objectives" in student materials assures that the objectives are communicated to the learner. "Appropriate reading level" is a critical characteristic particularly if much of the information is presented to the student in prose or text. Estimates of the reading materials are approximate. More specific reading levels can be determined by applying the Fry or other readability formulas (see Appendix E). Finally, the presence or absence of "activity lab sheets" provides some information about the nature of the unit and of the learning activities involved. "Attractiveness" is a characteristic which requires subjective judgement; however, this is a category which acknowledges especially well-produced instructional materials.

The amount and cost of "equipment and materials" needed for elementary science instruction may be limiting factors because few elementary classrooms contain adequate science equipment. Teachers and administrators are more likely
to be hesitant about selecting and implementing science programs or units which require large investments of money for highly specialized equipment. The descriptions of characteristics in this section will provide the user with information to make decisions based on financial considerations.

The availability of well-constructed and pilot-tested "assessment materials" (Section F) are of major importance if student learning is the goal of the marine education program. The items in this section are of three types. The first three items in the list identify the presence of actual instruments. "Unit effectiveness questionnaires" are often included with instructional materials which are being field-tested or re-evaluated for revision purposes. These questionnaires usually include questions which allow teachers to provide feedback to the developers regarding the strengths and weaknesses of the unit. "Written tests" should assess student learning stated in the objectives and are indispensable if learning is a goal. "Student attitude questionnaires" are an important consideration if the development of positive student affect is a purpose of the unit or program. Usually, the latter two types of instruments are administered to obtain individual student responses so that each student's learning or attitude is evaluated in light of the goals and objectives of the program or unit.

The second set of items in the assessment section includes less structured and less objective methods for determining student awareness, learning and/or affect. "Large group discussion", "small group discussion/demonstration", and "individual projects/performance" evaluation approaches allow the teacher to make general assessments. It is difficult, however, for anyone to make inferences about individual student learning when a large group discussion assessment approach is used.
The last two items in this section are of a miscellaneous nature. "Suggestions in the teacher's guide refers to the preceding three items and indicates whether methods for conducting less formal assessments are suggested. For example, suggestions for assessing student learning may include some discussion questions to be asked by the teacher during a class discussion. The last item in this section may seem absurd initially. However, these reviewers have seen enough assessment instruments and approaches which were not accompanied by "answers or evaluation criteria." Moreover, if the assessment items or questions are ambiguous (many often are) the correct answer is not easily discernible.

The appropriateness of the assessment depends on the purpose of the assessment. If the assessment of general awareness is the purpose of the assessment then the large or small group discussion approach may be appropriate. If the learning or affect of each student is the primary focus, then measures such as tests and questionnaires may be utilized.

The prior sections of Part 2 describe what is to be learned (content, skills), what teachers should know and do to teach (teacher materials), what students work with in the learning process (student materials, equipment) and what students have learned (assessment materials). Section G, "instructional modes," however, addresses how students are to learn. No single group of instructional modes is inherently better than another. A variety of instructional modes is an important consideration. The appropriateness of the mode for teaching particular types of objectives or students in particular grade levels is also an important consideration. In this review, however, only variety can be inferred from the information provided. The appropriateness of the instructional mode was not determined by the reviewers. The evaluation of the instructional modes utilized in the unit is based on the discretion of the user of this review.
Much of the discretion is based on the value judgements of the user. If for example, "hands-on" activity and scientific inquiry are valued, then the user will probably search for instructional approaches which include activity-oriented modes (i.e., the last five instructional modes in the list.) On the other hand, if the user values the acquisition of marine/aquatic-related information, then instruction which utilizes the first six modes will probably take more priority. The instructional modes are described in this section so that the user will have specific information for evaluation and decision-making.

The social context of the learning experience can be inferred from the instructional mode. For example, the first four modes imply a large group or whole class context. The next two modes, "quiet reading" and "written seatwork," imply an individual student context while "simulation games" almost always occur in a small group context. The remaining modes may occur in variable contexts. Again, the desirability of one social context over others depends on the values and goals of the user.

Finally, Section H describes critical relationships among instructional objectives, instruction, and assessment. Objectives serve several important functions in an instructional unit. They embody the content and skills to be (a) taught by the teacher and (b) learned by the student. The degree of the relationship between the objectives and instructional content and skills can be thought of as instructional validity while the relationship between the objectives and assessment items represents content test validity. Thus, the match between the objectives and instruction and assessment is one important indicator of valid, well-designed and developed instructional units.
PART III: REVIEWS OF PROJECT UNITS

The materials of ten elementary marine education projects were obtained in the search process and were reviewed. The ten projects are listed below:

1. Alaska Sea Week Curriculum Series (K-6)
   University of Alaska Sea Grant College

2. Coastal/Oceanic Awareness Studies (Project COAST) (K-6+)
   University of Delaware Sea Grant College

3. Environmental Education Program (K-6)
   Martin County Public Schools, Florida

4. Marine Science (1-6)
   Marine Science Center, Duval County, Florida

5. Northern New England Marine Education Project (NNMEP) (K-6)
   University of Maine Sea Grant College

6. Ocean In Your Classroom (K-6)
   Falmouth Schools/Massachusetts Extension Service

7. Ocean Related Curricular Activities (ORCA)(3-6)
   Pacific Science Center, Seattle, Washington

8. Project CAPE (Coastal Awareness in Public Education) (K-6)
   Dare County Public Schools, North Carolina

9. Sensing the Sea (K-3)
   Virginia Institute of Marine Science/
   The College of William and Mary

10. WET Basics Program (K-6)
    Falmouth Public Schools/Massachusetts Extension Service

The credentials of the reviewers are presented in their vitae (see Appendix D).

The reviews of the project units comprise the bulk of Part III. In order to facilitate the location of particular project reviews, tabs have been placed on each set of reviews and numbered to correspond with the above list.
PROGRAM: ALASKA SEA WEEK CURRICULUM SERIES 
DATE: 1980

ORGANIZATION: Alaska Sea Grant Program (with Juneau teachers, S.E. Res. Resource Center)
ADDRESS: University of Alaska
Fairbanks, Alaska 99701 Phone: (907) 479-7631

GRADE LEVELS: K-6 TYPE: PROGRAM X INFUSION UNITS ACTIVITIES

MATERIALS:
K Discovery
1 Sea Animals
2 Shells
3 Glacial and Intertidal Ecology
4 Birds
5 Fish
6 Man's Influence on the Sea

COST: There materials are only available in State at present. Revisions are planned for 1982 and copies will then be available on a cost basis.

1. PROGRAM CHARACTERISTICS

✓ Project information Funded: NOAA
   - Program goals and objectives
   ✓ Field-tested units and activities (state-wide)
   - Inservice training for teachers
   - U.S. Dept. of Commerce

2. UNIT CHARACTERISTICS

K 1 2 3 4 5 6 A. Content (✓ stated ✓ inferred)
0 0 0 0 0 0 0 organisms, life cycles
0 0 0 0 0 0 0 habitats, environmental factors, adaptation
0 0 0 0 0 0 0 communities
0 0 0 0 0 0 0 ecosystems (concepts, relationships)
0 0 0 0 0 0 0 water properties, tides
0 0 0 0 0 0 0 marine/aquatic geology, geography
0 0 0 0 0 0 0 interaction of people with marine/aquatic environments
0 0 0 0 0 0 0 ocean fronts/beaches/ sand dunes
0 0 0 0 0 0 0 estuaries/salt marshes
0 0 0 0 0 0 0 rivers/swamps
0 0 0 0 0 0 0 lakes/ponds
0 0 0 0 0 0 0 glaciers
B. Skills (✓ stated ✓ inferred)

1. observing (all senses)
2. identifying, classifying
3. measuring, quantifying
4. questioning, hypothesizing
5. inferring, analyzing, interpreting
6. summarizing, concluding
7. designing experiment, controlling variables
8. describing, communicating
9. manipulating
10. cooperating in groups
11. comparing

C. Teacher Material Characteristics

1. instructional objectives: awareness, learning, affect
2. student learning performance criterion
3. teacher background information
4. glossary of terms/concepts
5. student prerequisites
6. lesson preparation information
7. lesson plans: 5, 6, 2, 4, K, 3, 1

1. highly implicit
2. highly explicit

1. classroom management information
2. references to community/other resources
3. follow-up/enrichment activities
4. methods for integrating content with other subject areas
5. methods for implementation with special students

D. Student Material Characteristics

1. objectives
2. information: prose, pictorial
3. reading level appropriate
4. activity/lab sheets (in teacher's guide, purchase separate)
5. attractive
### E. Equipment/Materials

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</table>
| 0 | 0 | 0 | 0 | 0 | 0 | home-made  
| 0 | 0 | 0 | 0 | 0 | 0 | locally obtainable  
| 0 | 0 | 0 | 0 | 0 | 0 | specialized, must be ordered  
| 0 | 0 | 0 | 0 | 0 | 0 | live organisms  
| 0 | 0 | 0 | 0 | 0 | 0 | packaged kits with program  

### F. Assessment Materials and Characteristics

| 0 | 0 | 0 | 0 | 0 | 0 | unit effectiveness questionnaires  
| 0 | 0 | 0 | 0 | 0 | 0 | written tests: pretest, posttest  
| 0 | 0 | 0 | 0 | 0 | 0 | student attitude questionnaires  
| 0 | 0 | 0 | 0 | 0 | 0 | large group discussion  
| 0 | 0 | 0 | 0 | 0 | 0 | small group discussion/demonstration  
| 0 | 0 | 0 | 0 | 0 | 0 | individual projects/performances  
| 0 | 0 | 0 | 0 | 0 | 0 | suggestions in the teacher's guide  
| 0 | 0 | 0 | 0 | 0 | 0 | answers or evaluation criteria  

### G. Instructional Modes

| 0 | 0 | 0 | 0 | 0 | 0 | teacher lecture, presentation  
| 0 | 0 | 0 | 0 | 0 | 0 | teacher demonstration  
| 0 | 0 | 0 | 0 | 0 | 0 | teacher/student discussion  
| 0 | 0 | 0 | 0 | 0 | 0 | audio-visual presentation  
| 0 | 0 | 0 | 0 | 0 | 0 | quiet reading for students  
| 0 | 0 | 0 | 0 | 0 | 0 | written seatwork  
| 0 | 0 | 0 | 0 | 0 | 0 | activities with concrete materials  
| 0 | 0 | 0 | 0 | 0 | 0 | student experimentation  
| 0 | 0 | 0 | 0 | 0 | 0 | simulation games  
| 0 | 0 | 0 | 0 | 0 | 0 | other instructional games  
| 0 | 0 | 0 | 0 | 0 | 0 | field experiences (pre-planned/to be planned by teacher)  
| 0 | 0 | 0 | 0 | 0 | 0 | student projects  
| 0 | 0 | 0 | 0 | 0 | 0 |  


H. Relationships Among Instructional Objectives, Instruction and Assessment

The instructional objectives and the unit components below can be described as:

1 not related
2 vaguely related
3 somewhat related
4 highly related

K 1 2 3 4 5 6
4 4 4 4 3 2

content/skills of the instruction

assessment items

COMMENTS:

K-1 Excellent teacher materials. Teachers are explicitly told what to discuss and not simply to discuss.

2 Too much emphasis on scientific terms?

3 Activities too complex for third graders? i.e., glaciers
   reading, field trip approach
4 Confusing organization of activities.

5 Unclear relationship or transition between activities, i.e., transect--land use

6 Confusing relationship between lessons and student materials
PROGRAM: COASTAL/OCEANIC AWARENESS STUDIES (Project COAST) DATE: 1974-

ORGANIZATION: Marine Environment Curric. Study/Population Environment Curric. Study

ADDRESS: Willard Hall, Education Bldg.
University of Delaware
Newark, Delaware 19711

GRADE LEVELS: K-12 TYPE: PROGRAM X INFUSION UNITS X ACTIVITIES

MATERIALS:

K  Animals with Shells (#101) (see col. K) $ .50
1-3 Dunes At Play (#107) (see col. 1) $1.85
3-5 Not So Common Oyster (#109) (see col. 3) $1.70
4-7 Animal Behavior -- Mod Snail Responses (#113) (see col. 4) $ .50
3-6 Horseshoe Crab (#111) (see col. 5) $1.10
6-8 Utilization of Estuarine Organisms by Indians (#210) (see col. 6a) $11.75
6-8 Bay Dune Transect at Cape Henlopen St. Pk. (#216) (see col. 6b) $ .50

COST: variable—Write to Project Coast for a complete listing of units and prices

1. PROGRAM CHARACTERISTICS

✓ Program information
___ Program goals and objectives
___ Field-tested units and activities
___ Inservice training for teachers

2. UNIT CHARACTERISTICS

K 1 2 3 4 5 6a 6b A Content (√inferred)

0 0 0 0 0 0 0 organisms, life cycles
0 0 0 0 0 0 0 habitats, environmental factors, adaptation
0 0 0 0 0 0 0 communities
0 0 0 0 0 0 0 ecosystems (concepts, relationships)
0 0 0 0 0 0 0 water properties
0 0 0 0 0 0 0 marine/aquatic geology, geography
0 0 0 0 0 0 0 interaction of people with marine/aquatic environments
0 0 0 0 0 0 0 ocean fronts/beaches/ sand dunes
0 0 0 0 0 0 0 estuaries/salt marshes
0 0 0 0 0 0 0 rivers/swamps
0 0 0 0 0 0 0 lakes/ponds
B. Skills (✓ stated, ✓ inferred)

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- observing (all senses)
- identifying, classifying
- measuring, quantifying
- questioning, hypothesizing
- inferring, analyzing, interpreting
- summarizing, concluding
- designing experiment, controlling variables
- describing, communicating
- manipulating
- cooperating in groups
- reading skills

C. Teacher Material Characteristics

- instructional objectives: awareness, learning, affect
- student learning performance criterion
- teacher background information
- glossary of terms/concepts
- student prerequisites
- lesson preparation information
- lesson plans: highly implicit, highly explicit
- classroom management information
- references to community/other resources
- follow-up/enrichment activities
- methods for integrating content with other subject areas
- methods for implementation with special students

D. Student Material Characteristics

- objectives
- information: prose, pictorial
- reading level appropriate
- activity/lab sheets (in teacher's guide, purchase separately)
- attractive
- activity self-management information
- self-tests
F. Assessment Materials and Characteristics

- unit effectiveness questionnaires
- written tests: pretest, posttest
- student attitude questionnaires
- large group discussion
- small group discussion/demonstration
- individual projects/performance
- suggestions in the teacher's guide
- answers or evaluation criteria

G. Instructional Modes

- teacher lecture, presentation
- teacher demonstration
- teacher/student discussion
- audio-visual presentation
- quiet reading for students
- written seatwork
- activities with concrete materials
- student experimentation
- simulation games
- other instructional games
- field experiences (pre-planned/to be planned by teacher)
- dramatics, story-telling activities
H. Relationships Among Instructional Objectives, Instruction, and Assessment

The instructional objectives and the unit components below can be described as:

1. not related
2. vaguely related
3. somewhat related
4. highly related

1 2 3 4 5 6a 6b
1.5 2 3 4 4 3* content/skills of the instruction
1 4 1 4 4 assessment items

COMMENTS:

1 Written tests are in open-ended question format; subjectivizing scoring

5 No use of horseshoe crab specimens; students research crab information in library books

6a Good unit! Nice slides! Good model for teacher background information on cultural, ecological and historical perspectives of coastal areas. No explicit instructions on how to make the various projects.

6b Effectiveness is highly dependent on the teacher’s knowledge. Instructional procedures lack detail for the inexperienced teacher. Transect of vegetation only. Activities appropriate for sand dunes in general.
PROGRAM: ENVIRONMENTAL EDUCATION PROGRAM            DATE: 1975
ORGANIZATION: Martin County Schools Environmental Education Center
ADDRESS: 2900 NE Indian River Drive
Jensen Beach, Florida 33457
GRADE LEVELS: K-6            TYPE: Program
                      Infusion Units
                      Activities
MATERIALS: K through grade 6 teachers' guides
          program information booklet

COST: Write for current prices.

1. PROGRAM CHARACTERISTICS

✓ Program information
✓ Program goals and objectives
✓ Field-tested units and activities
✓ Inservice training for teachers

Fund: ESEA Title III

2. UNIT CHARACTERISTICS

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<tr>
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</table>
| V |   |   |   |   |   |   | organisms, life cycles
V |   |   |   |   |   |   | habitats, environmental factors, adaptation
0 0 0 0 0 0 0 | communities, food chain/web
0 0 0 0 0 0 0 | ecosystems (concepts, relationships)
0 0 0 0 0 0 0 | water properties
0 0 0 0 0 0 0 | marine/aquatic geology, geography
0 0 0 0 0 0 0 | interaction of people with marine/aquatic environments
0 0 0 0 0 0 0 | ocean fronts/beaches/ sand dunes
0 0 0 0 0 0 0 | estuaries/salt marshes/grassflats/mangrove community
0 0 0 0 0 0 0 | rivers/swamps
0 0 0 0 0 0 0 | lakes/ponds

A. Content (✓ stated ✓ inferred)
### B. Skills (✓ stated ✓ inferred)

- observing (all senses)
- identifying, classifying
- measuring, quantifying
- questioning, hypothesizing
- inferring, analyzing, interpreting
- summarizing, concluding
- designing experiment, controlling variables
- describing, communicating
- manipulating
- cooperating in groups

### C. Teacher Material Characteristics

- Instructional objectives: awareness, learning, affect
- Student learning performance criterion
- Teacher background information
- Glossary of terms/concepts
- Student prerequisites
- Lesson preparation information
- Lesson plans: 
  - Highly implicit
  - Highly explicit
- Classroom management information
- References to community/other resources
- Follow-up/enrichment activities
- Methods for integrating content with other subject areas
- Methods for implementation with special students
- Environmental studies center activity plans

### D. Student Material Characteristics

- Objectives
- Information: prose, pictorial
- Reading level appropriate
- Activity/lab sheets (in teacher's guide, purchase separately)
- Attractive
E. Equipment/Materials

- home-made
- locally obtainable
- specialized, must be ordered from E.S. center
- live organisms (provided at E.S. center)
- packaged kits with program

F. Assessment Materials and Characteristics

- unit effectiveness questionnaires
- written tests: pretest, posttest (test means of previous student samples are given)
- student attitude questionnaires
- large group discussion
- small group discussion/demonstration
- individual projects/performance
- suggestions in the teacher's guide
- answers or evaluation criteria

G. Instructional Modes

- teacher lecture, presentation
- teacher demonstration
- teacher/student discussion
- audio-visual presentation
- quiet reading for students
- written seatwork
- activities with concrete materials
- student experimentation (at E.S. center)
- simulation games
- other instructional games
- field experiences (pre-planned/to be planned by teacher)
  (conducted at E.S. center)
ENVIRONMENTAL EDUCATION PROGRAM

H. Relationships Among Instructional Objectives, Instruction, and Assessment

The instructional objectives and the unit components below can be described as:

1. not related
2. vaguely related
3. somewhat related
4. highly related

K 1 2 3 4 5 6

4 4 4 4 4 4 4

content/skills of the instruction

4 4 4 4 4 4 4

assessment items

COMMENTS:

PROGRAM:
Excellent specification of adoption procedures
Laudable effort to assess learning stated in the objectives in light of specified criterion and based on field-test data.
Well-specified environmental studies center activities
Some test items are not content valid and are awkwardly written.
The lower-than-hoped-for performance of students may in part be due to the items and not the instruction.

4. What does the teacher do in unit II? Instructional activities are vague (discussion/quiet reading??) More explicit lesson plans needed to implement unit. 4C item test seem difficult.

5. Grassflat habitat inconsistently used. What not community?

6. No guidelines for E.S. center follow-up discussions. No self-evaluation tests.
PROGRAM: MARINE SCIENCE                     DATE: ?

ORGANIZATION: Marine Science Center (Duval County)

ADDRESS: 1347 Palmer Street

Mayport, Florida 32233

GRADE LEVELS: 1-5  TYPE: PROGRAM INFUSION UNITS ACTIVITIES

MATERIALS:

Marine Science, teachers' guides (grades 1-4)
Marine Science Education Center Guidebook, grade 5 (revised 1975)

* Marine Science, teacher's guide (grade 5)
* Marine Messages
* Student Data Book

* Not reviewed

COST: $1.00 each grade level unit

1. PROGRAM CHARACTERISTICS
   ___ Program information
   ___ Program goals and objectives
   ___ Field-tested units and activities
   ___ Inservice training for teachers

2. UNIT CHARACTERISTICS

   K 1 2 3 4 5 6

A. Content (stated √ inferred)

0 0 0 0 0 0 0 organisms, life cycles
0 0 0 0 0 0 habitats, environmental factors, adaptation, food chain
0 0 0 0 0 0 communities
0 0 0 0 0 0 ecosystems (concepts, relationships)
0 0 0 0 0 0 water properties
0 0 0 0 0 0 marine/aquatic geology, geography, oceanography
0 0 0 0 0 0 interaction of people with marine/aquatic environments
0 0 0 0 0 0 ocean fronts/beaches/ sand dunes
0 0 0 0 0 0 estuaries/salt marshes
0 0 0 0 0 0 rivers/swamps
0 0 0 0 0 0 lakes/ponds
B. Skills (stated \textit{v} inferred)

- observing (all senses)
- identifying, classifying
- measuring, quantifying
- questioning, hypothesizing
- inferring, analyzing, interpreting
- summarizing, concluding
- designing experiment, controlling variables
- describing, communicating
- manipulating
- cooperating in groups
- comparing

C. Teacher Material Characteristics

- instructional objectives: awareness, learning, affect
- student learning performance criterion
- teacher background information
- glossary of terms/concepts
- student prerequisites
- lesson preparation information
- lesson plans: \begin{enumerate}
\item \textit{highly implicit}
\item \textit{1,2,3,5}
\end{enumerate}
- classroom management information
- references to community/other resources
- follow-up/enrichment activities
- methods for integrating content with other subject areas
- methods for implementation with special students
- statements of content generalizations

D. Student Material Characteristics

- objectives
- information: prose, pictorial
- reading level appropriate
- activity/tab sheets (in \textit{teacher's guide}, purchase separately)
- attractive
E. Equipment/Materials

0 0 0 0 0 0  home-made
0 0 0 0 0 0  locally obtainable
0 0 0 0 0 0  specialized, must be ordered
0 0 0 0 0 0  live organisms
0 0 0 0 0 0  packaged kits with program (supplied by center)

F. Assessment Materials and Characteristics

0 0 0 0 0 0  unit effectiveness questionnaires
0 0 0 0 0 0  written tests: pretest, posttest
0 0 0 0 0 0  student attitude questionnaires
0 0 0 0 0 0  large group discussion
0 0 0 0 0 0  small group discussion/demonstration
0 0 0 0 0 0  individual projects/performance
0 0 0 0 0 0  suggestions in the teacher's guide
0 0 0 0 0 0  answers or evaluation criteria

G. Instructional Modes

0 0 0 0 0 0  teacher lecture, presentation
0 0 0 0 0 0  teacher demonstration
0 0 0 0 0 0  teacher/student discussion
0 0 0 0 0 0  audio-visual presentation
0 0 0 0 0 0  quiet reading for students
0 0 0 0 0 0  written seatwork
0 0 0 0 0 0  activities with concrete materials
0 0 0 0 0 0  student experimentation
0 0 0 0 0 0  simulation games
0 0 0 0 0 0  other instructional games
0 0 0 0 0 0  field experiences (pre-planned/to be planned by teacher)
0 0 0 0 0 0
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H. Relationships Among Instructional Objectives, Instruction and Assessment

The instructional objectives and the unit components below can be described as:

1. not related
2. vaguely related
3. somewhat related
4. highly related

K 1 2 3 4 5 6

- 3 3 3 * * -  content/skills of the instruction
- 3 3 3 * * -  assessment items

* No clear objectives stated, only generalizations and topics of content

COMMENTS:

1. Why "weird" fish?
2-3. Quick treatment of content
4. Highly information oriented. Most activities involve student reports.
5. Classroom activities more integrated with center activities
PROGRAM: NORTHERN NEW ENGLAND MARINE EDUCATION PROJECT (NNMEP)  DATE:  1978

ORGANIZATION: Univ. of Maine College of Education, Maine-New Hampshire Sea Grant

ADDRESS: Shibles Hall, College of Education
University of Maine at Orono
Orono, Maine  04469

GRADE LEVELS:  X  K-8  TYPE:  ❌  PROGRAM  ✗  INFUSION UNITS  ❌  ACTIVITIES

MATERIALS:  Teachers' Guides

 K  Clams and Other Critters
   *  4-6 Whale Multi-Disciplinary Studies

   *  K-1 Marine Art
     6  Our Heritage of Ships

   2  The Aquarium
     7  Ships, Shipping, Waterways

   *  3  The Beaver
     8  Coastal Indians of New England

   *  4  The Lobster
     *Not reviewed

 4-6  Have You Been To The Shore
     Before? (see col. 4)

COST:  Write for information and current prices

-------------------------------

1. PROGRAM CHARACTERISTICS

 ___ Program information
 ___ Program goals and objectives  Funded: Sea Grant
 ___ Field-tested units and activities
 ___ Inservice training for teachers

2. UNIT CHARACTERISTICS

 K  1  2  3  4  5  6  A. Content (✓ stated ✗ inferred)

 0  0  0  0  0  0  organisms, life cycles

 0  0  0  0  0  0  habitats, environmental factors, adaptation

 0  0  0  0  0  0  communities

 0  0  0  0  0  0  ecosystems (concepts, relationships)

 0  0  0  0  0  0  water properties

 0  0  0  0  0  0  marine/aquatic geology, geography

 0  0  0  0  0  0  interaction of people with marine/aquatic environments

 0  0  0  0  0  0  ocean fronts/beaches/ sand dunes

 0  0  0  0  0  0  estuaries/salt marshes

 0  0  0  0  0  0  rivers/swamps

 0  0  0  0  0  0  lakes/ponds
B. Skills (stated, inferred)

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observing (all senses)
identifying, classifying
measuring, quantifying
questioning, hypothesizing
inferring, analyzing, interpreting
summarizing, concluding
designing experiment, controlling variables
describing, communicating
manipulating
cooperating in groups

C. Teacher Material Characteristics

- instructional objectives: awareness, learning, affect
- student learning performance criterion
- teacher background information
- glossary of terms/concepts
- student prerequisites
- lesson preparation information
- lesson plans: 
  - K1, 2
  - highly implicit
  - highly explicit
- classroom management information
- references to community/other resources
- follow-up/enrichment activities
- methods for integrating content with other subject areas
- methods for implementation with special students

D. Student Material Characteristics

- objectives
- information: prose, pictorial
- reading level appropriate
- activity/lab sheets (in teacher's guide, purchase separately)
- attractive
### E. Equipment/Materials

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### F. Assessment Materials and Characteristics

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### G. Instructional Modes

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H. Relationships Among Instructional Objectives, Instruction and Assessment

The instructional objectives and the unit components below can be described as:

1 not related
2 vaguely related
3 somewhat related
4 highly related

K 1 2 3 4 5 6

2 - * 3 -
- - - - - -

content/skills of the instruction
assessment items

"The relationship cannot be determined due to the lack of stated objectives"

COMMENTS:

K Excellent resources for field trips. Good model for "what to look for on the shore." Lacks explicit details for carrying out the activities.
PROGRAM: OCEAN IN YOUR CLASSROOM

ORGANIZATION: Falmouth School and the Southeastern Massachusetts Cooperative Ext. Serv.

ADDRESS: Cape Cod Extension Office

Railroad Ave., Barnstable, MA 02630

GRADE LEVELS: K-6 TYPE: X PROGRAM INFUSION UNITS ACTIVITIES

MATERIALS: Teachers' Guides

K-3 Part I Introduction (see col. X)

Part II Setting Up (not available for review)

K-6 Part III Activities (see col. 1)

1-6 Part IV Beach Combing (see col. 2)

1-6 Beach Comber Study Guide (see col. 3)

COST: Write for information regarding the current availability of the units

1. PROGRAM CHARACTERISTICS

 Program information
 Project ✓ Program goals and objectives
 Field-tested units and activities
 Inservice training for teachers

2. UNIT CHARACTERISTICS

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A. Content (✓ stated ✓ inferred)

organisms, life cycles

habitats, environmental factors, adaptation

communities

ecosystems (concepts, relationships)

water properties

marine/aquatic geology, geography

interaction of people with marine/aquatic environments

ocean fronts/beaches/ sand dunes

estuaries/salt marshes

rivers/swamps

lakes/ponds
B. Skills (✓ stated ✓ inferred)

- Observing (all senses)
- Identifying, classifying
- Measuring, quantifying
- Questioning, hypothesizing
- Inferring, analyzing, interpreting
- Summarizing, concluding
- Designing experiment, controlling variables
- Describing, communicating
- Manipulating
- Cooperating in groups

C. Teacher Material Characteristics

- Instructional objectives: awareness, learning, affect
- Student learning performance criterion
- Teacher background information
- Glossary of terms/concepts
- Student prerequisites
- Lesson preparation information
- Lesson plans: \(K_{1,3} \), \(L_{1,2}\)
- Highly implicit
- Highly explicit
- Classroom management information
- References to community/other resources
- Follow-up/enrichment activities
- Methods for integrating content with other subject areas
- Methods for implementation with special students

D. Student Material Characteristics

- Objectives
- Information: prose, pictorial
- Reading level appropriate
- Activity/lab sheets (in teacher's guide, purchase separately)
- Attractive
### Equipment/Materials

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- home-made
- locally obtainable
- specialized, must be ordered
- live organisms
- packaged kits with program

### Assessment Materials and Characteristics

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- unit effectiveness questionnaires
- written tests: pretest, posttest
- student attitude questionnaires
- large group discussion
- small group discussion/demonstration
- individual projects/performance
- suggestions in the teacher's guide
- answers or evaluation criteria

### Instructional Modes

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- teacher lecture, presentation
- teacher demonstration
- teacher/student discussion
- audio-visual presentation
- quiet reading for students
- written seatwork
- activities with concrete materials
- student experimentation
- simulation games
- other instructional games
- field experiences (pre-planned/to be planned by teacher)
H. Relationships Among Instructional Objectives, Instructor and Assessment

The instructional objectives and the unit components below can be described as:

1. not related
2. vaguely related
3. somewhat related
4. highly related

K 1 2 3 4 5 6

J 4 * * * * content/skills of the instruction

* * * * * assessment items

* The relationships cannot be determined due to the lack of stated objectives.

COMMENTS:

X Sample script of classroom discussion provided. This is helpful for the teacher who has not taught the unit before.

6 Many statements about what to do with the organisms but the inexperienced teacher would probably not know how to do them.
PROGRAM: OCEAN RELATED CURRICULUM ACTIVITIES (ORCA) DATE: 1980
ORGANIZATION: Pacific Science Center (Sea Grant Marine Education Project)
ADDRESS: 200 Second Avenue North
Seattle, Washington 98109 Phone: (206) 625-9333
GRADE LEVELS: 3-6 TYPE: ___ PROGRAM ___ INFUSION UNITS ___ ACTIVITIES

MATERIALS: Teacher's Guides and Student Materials

- 3-4 Life Cycle of the Salmon (see col. 3)
- 4 High Tide, Low Tide
- 4-5 Water Birds (see col. 5)
- 4-6 Whales

* Not available for review

COST: $5.00 each unit.

1. PROGRAM CHARACTERISTICS

___ Program information
___ Program goals and objectives
___ Field-tested units and activities
___ Inservice training for teachers

2. UNIT CHARACTERISTICS

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A. Content (✓ stated _ inferred)

- organisms, life cycles
- habitats, environmental factors, adaptation
- communities
- ecosystems (concepts, relationships)
- water properties
- marine/aquatic geology, geography
- interaction of people with marine/aquatic environments
- ocean fronts/beaches/sand dunes
- estuaries/salt marshes
- rivers/swamps
- lakes/ponds
### B. Skills (✓ stated ✓ inferred)

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- observing (all senses)
- identifying, classifying
- measuring, quantifying
- questioning, hypothesizing
- inferring, analyzing, interpreting
- summarizing, concluding
- designing experiment, controlling variables
- describing, communicating
- manipulating
- cooperating in groups

### C. Teacher Material Characteristics

- instructional objectives: awareness, learning, affect
- student learning performance criterion
- teacher background information
- glossary of terms/concepts
- student prerequisites
- lesson preparation information
- lesson plans: 3,5

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- highly implicit
- highly explicit

- classroom management information
- references to community/other resources
- follow-up/enrichment activities
- methods for integrating content with other subject areas
- methods for implementation with special students

### D. Student Material Characteristics

- objectives
- information: prose, pictorial
- reading level appropriate (reading levels are specified)
- activity/lab sheets (in teacher's guide, purchase separately)
- attractive
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| F. Assessment Materials and Characteristics |
|   | unit effectiveness questionnaires |
|   | written tests: pretest, posttest |
|   | student attitude questionnaires |
|   | large group discussion |
|   | small group discussion/demonstration |
|   | individual projects/performance |
|   | suggestions in the teacher's guide |
|   | answers or evaluation criteria |

|   | 0 | 0 | 0 | 0 | 0 | 0 |
| G. Instructional Modes |
|   | teacher lecture, presentation |
|   | teacher demonstration |
|   | teacher/student discussion |
|   | audio-visual presentation |
|   | quiet reading for students |
|   | written seatwork |
|   | activities with concrete materials |
|   | student experimentation |
|   | simulation games |
|   | other instructional games |
|   | field experiences (pre-planned/to be planned by teacher) |
H. Relationships Among Instructional Objectives, Instruction, and Assessment

The instructional objectives and the unit components below can be described as:

1. not related
2. vaguely related
3. somewhat related
4. highly related

K 1 2 3 4 5 6
- - - 4 - 4 -
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content/skills of the instruction
assessment items

COMMENTS:

3. Good integration of resources in unit. All activities are interdisciplinary yet emphasize science content. Supplementary resources are suggested for field experiences.

Excellent student materials. Graphics are well-done.
PROGRAM: PROJECT CAPE TEACHING MODULES

DATE: 1980-

ORGANIZATION: Dare County Public Schools

ADDRESS: P.O. Box 640

Manteo, North Carolina 27954

GRADE LEVELS: K-6

TYPE: PROGRAM

X INFUSION UNITS

ACTIVITIES

MATERIALS: Teachers' guides and student materials

- K-2 Water World Creatures (see col. 1)
- K-2 A Sea Creature Treasury (see col. 2)
- 5-6 Navigation (see col. 5)

COST: Because the project is still in development, write for further information.

1. PROGRAM CHARACTERISTICS

- Program information

Project

✓ Program goals and objectives

Field-tested units and activities

Inservice training for teachers

Funded: ESEA Title IV-C

2. UNIT CHARACTERISTICS

K 1 2 3 4 5 6

A. Content (✓ stated ✓ inferred)

0 0 0 0 0 0 0 organisms, life cycles
0 0 0 0 0 0 0 habitats, environmental factors, adaptation
0 0 0 0 0 0 0 communities
0 0 0 0 0 0 0 ecosystems (concepts, relationships)
0 0 0 0 0 0 0 water properties
0 0 0 0 0 0 0 marine/aquatic geology, geography
0 0 0 0 0 0 0 interaction of people with marine/aquatic environments
0 0 0 0 0 0 0 ocean fronts/beaches/ sand dunes
0 0 0 0 0 0 0 estuaries/salt marshes
0 0 0 0 0 0 0 rivers/swamps
0 0 0 0 0 0 0 lakes/ponds
### B. Skills (✓stated ✓inferred)

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- observing (all senses)
- identifying, classifying
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- inferring, analyzing, interpreting
- summarizing, concluding
- designing experiment, controlling variables
- describing, communicating
- manipulating
- cooperating in groups
- comparing

### C. Teacher Material Characteristics

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- instructional objectives: awareness, learning, affect
- student learning performance criterion
- teacher background information
- glossary of terms/concepts
- student prerequisites
- lesson preparation information
- lesson plans: 1, 2, 5
- highly implicit
- highly explicit
- classroom management information
- references to community/other resources
- follow-up/enrichment activities
- methods for integrating content with other subject areas
- methods for implementation with special students

### D. Student Material Characteristics

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- objectives
- information: prose, pictorial
- reading level appropriate
- activity/lab sheets (in teacher's guide, purchase separately)
- attractive
### E. Equipment/Materials

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### F. Assessment Materials and Characteristics

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### G. Instructional Modes

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H. Relationships Among Instructional Objectives, Instructional and Assessment

The instructional objectives and the unit components below can be described as:

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content/skills of the instruction

assessment items

COMMENTS:

1, 2 Lessons include many interdisciplinary activities. The focus seems to be on the activities and less on marine content.

Too low-leveled for second graders? Good for low aptitude second graders.

Well-planned synthesis activities. Nice instructional games with attractive graphics.

No interaction with live marine organisms unless students take field trip to science center.

Unclear distinction between instructional objectives and student learning outcomes.
PROGRAM: SENSING THE SEA

ORGANIZATION: Virginia Institute of Marine Sci./ The College of William and Mary

ADDRESS: Gloucester Point, Virginia 23062

GRADE LEVELS: K-3 TYPE: PROGRAM X INFUSION UNITS ACTIVITIES

MATERIALS:

K-1 Teacher's Guide (see col. 1) (12-13 periods)
2-3 Teacher's Guide (see col. 3) (20-23 periods)

COST: $2.00 per unit

1. PROGRAM CHARACTERISTICS
   ___ Program information
   ___ Program goals and objectives
   ___ Field-tested units and activities
   ___ Inservice training for teachers

   Uses ESS, SAPA, SCIS approaches

2. UNIT CHARACTERISTICS

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   A. Content (___stated ___inferred)

   0 0 0 0 0 0 0 organisms, life cycles
   0 0 0 0 0 0 0 habitats, environmental factors, adaptation
   0 0 0 0 0 0 0 communities
   0 0 0 0 0 0 0 ecosystems (concepts, relationships)
   0 0 0 0 0 0 0 water properties
   0 0 0 0 0 0 0 marine/aquatic geology, geography
   0 0 0 0 0 0 0 interaction of people with marine/aquatic environments
   0 0 0 0 0 0 0 ocean fronts/beaches/ sand dunes
   0 0 0 0 0 0 0 estuaries/salt marshes
   0 0 0 0 0 0 0 rivers/swamps
   0 0 0 0 0 0 0 lakes/ponds
   0 basic concepts: color, shape, size, number, sounds, texture
### B. Skills (✓ stated _ inferred)

- observing (all senses)
- identifying, classifying
- measuring, quantifying
- questioning, hypothesizing
- inferring, analyzing, interpreting
- summarizing, concluding
- designing experiment, controlling variables
- describing, communicating
- manipulating
- cooperating in groups
- following directions
- comparing

### C. Teacher Material Characteristics

- instructional objectives: awareness, learning, affect
- student learning performance criterion
- teacher background information
- glossary of terms/concepts
- student prerequisites
- lesson preparation information
- lesson plans: highly implicit
- classroom management information
- highly explicit
- references to community/other resources
- follow-up/enrichment activities
- methods for integrating content with other subject areas
- methods for implementation with special students

### D. Student Material Characteristics

- objectives
- information: prose, pictorial
- reading level appropriate
- activity/lab sheets (in teacher's guide, purchase separately)
- attractive
E. Equipment/Materials

- home-made
- locally obtainable
- specialized, must be ordered
- live organisms
- packaged kits with program

F. Assessment Materials and Characteristics

- unit effectiveness questionnaires
- written tests: pretest, posttest
- student attitude questionnaires
- large group discussion
- small group discussion/demonstration
- individual projects/performance
- suggestions in the teacher's guide
- answers or evaluation criteria

G. Instructional Modes

- teacher lecture, presentation
- teacher demonstration
- teacher/student discussion
- audio-visual presentation
- quiet reading for students
- written seatwork
- activities with concrete materials
- student experimentation
- simulation games
- other instructional games, learning center activities
- field experiences (pre-planned/to be planned by teacher)
- attitude awareness activities
- drill activities
H. Relationships Among Instructional Objectives, Instruction and Assessment

The instructional objectives and the unit components below can be described as:

1  not related
2  vaguely related
3  somewhat related
4  highly related

K 1 2 3 4 5 6
- 4  4  -  - -
- 4  4  -  - -

content/skills of the instruction

assessment items

COMMENTS:

1  Instructional plans include specific teacher questions to ask students during discussion. The teacher sets up the aquarium with students, not before class. Good use of marine content to develop inquiry skills and basic concepts.

3  Well-developed activities; attitude awareness activities and "drill" activities are also included.
Program: WET BASICS PROGRAM

Organization: Falmouth Public Schools/4-H Program, Cape Cod Extension Service

Address: Massachusetts Extension Service, P.O. Box 86

Falmouth, Massachusetts 02541 Phone: (617) 548-7101

Grade Levels: K-6 Type: Program Infusion Units X Activities

Materials:
- Program Information (Overview, Approach to Problem Solving, Mental Development)
- Sample Activities Packet (water properties, water organisms)
  (grades 2-4, see col. 4)

Cost: Because the project is still in development, write for further information.

1. Program Characteristics
- √ Program Information
- √ Program Goals and Objectives
- √ Field-tested units and activities
- Inservice training for teachers

Funded: ESEA Title IV-C

2. Unit Characteristics

K 1 2 3 4 5 6

A. Content (√ stated _ inferred)

0 0 0 0 0 0 0 Organisms, life cycles
0 0 0 0 0 0 habitats, environmental factors, adaptation
0 0 0 0 0 0 communities
0 0 0 0 0 0 ecosystems (concepts, relationships)
0 0 0 0 0 0 water properties
0 0 0 0 0 0 marine/aquatic geology, geography
0 0 0 0 0 0 interaction of people with marine/aquatic environments
0 0 0 0 0 0 ocean fronts/beaches/ sand dunes
0 0 0 0 0 0 estuaries/salt marshes
0 0 0 0 0 0 rivers/swamps
0 0 0 0 0 0 lakes/ponds
### B. Skills (\(\checkmark\) stated _inferred)

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</table>

- observing (all senses)
- identifying, classifying
- measuring, quantifying
- questioning, hypothesizing
- inferring, analyzing, interpreting
- summarizing, concluding
- designing experiment, controlling variables
- describing, communicating
- manipulating
- cooperating in groups
- formulating models

### C. Teacher Material Characteristics

<table>
<thead>
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</table>

- Instructional objectives: awareness, learning, affect
- student learning performance criterion
- teacher background information
- glossary of terms/concepts
- student prerequisites
- lesson preparation information
- lesson plans:
  - highly implicit
  - highly explicit
- classroom management information
- references to community/other resources
- follow-up/enrichment activities
- methods for integrating content with other subject areas
- methods for implementation with special students

### D. Student Material Characteristics

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</tbody>
</table>

- objectives
- information: prose, pictorial
- reading level appropriate
- activity/lab sheets (in teacher's guide, purchase separately)
- attractive
### E. Equipment/Materials

- home-made
- locally obtainable
- specialized, must be ordered
- live organisms
- packaged kits with program

### F. Assessment Materials and Characteristics

- unit effectiveness questionnaires
- written tests: pretest, posttest
- student attitude questionnaires
- large group discussion
- small group discussion/demonstration
- individual projects/performance
- suggestions in the teacher's guide
- answers or evaluation criteria
  *not available for review

### G. Instructional Modes

- teacher lecture, presentation
- teacher demonstration
- teacher/student discussion
- audio-visual presentation
- quiet reading for students
- written seatwork
- activities with concrete materials
- student experimentation
- simulation games
- other instructional games
- field experiences (pre-planned/to be planned by teacher)
H. Relationships Among Instructional Objectives, Instruction and Assessment

The instructional objectives and the unit components below can be described as:

<table>
<thead>
<tr>
<th></th>
<th>not related</th>
<th>vaguely related</th>
<th>somewhat related</th>
<th>highly related</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>4</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

K 1 2 3 4 5 6

- - - - - 4? - -
- - - - NA - -

content/skills of the instruction
assessment items

COMMENTS:

Concept of "basic skills" is couched in a cognitive development perspective and not in the traditional sense of basic skills. Program developers intended units to be child-development based and to focus on problem solving approaches.

In the sample unit reviewed, there appeared to be little relation or application of the water property concepts and information developed to the marine or aquatic environment.

Caution: The evaluation of the characteristics of all program units should not be made on the basis on one sample unit. However, for review purposes, this reviewer hopes that this unit is representative of other units. It should also be noted that the sample materials were still in rough draft form. This program should be considered further and those interested should obtain more units for review.
PART IV: REVIEW SUMMARIES AND FINDINGS

To enhance the utility of this review effort, summaries of descriptive information regarding the ten projects will be presented in tabular form. Findings will be discussed and exemplary components of particular project units will be noted in the last section of this part of the report.

The focus of this review is one of instructional development and the marine content of the units was reviewed in light of this perspective. The evaluation of the accuracy of the marine subject matter or the appropriateness of the selection of specific content for various activity sequences was not a purpose of the reviewers and can be better made by individual users and marine specialists. Again, the purpose of the review is to provide descriptive information, as objectively as possible, but within the parameters of what is known about needs and problems regarding elementary science program development, teacher experience, and student learning.

A. Basic Project Information

The columns of Table 3 display basic project information regarding the grade levels included in the project, the sources of project development funds, the completion or copyright date, and the type of project.

```
Insert Table 3 about here
```

Of the ten projects reviewed, three development institutions are in the southeastern region, two are in the middle Atlantic states, three are in New England and two are in the Pacific northwest. About one-third of the projects were developed by Sea Grant funds, one-third by federal funds (Title III or IVC) and one-third by local school district or state funds. One half of the
projects were directed by university personnel. Four were developed more than five years ago, and four were developed within the last two years, two of which are still being developed.

On the basis of this review, a number of projects which were originally described as "programs" (refer to Table 2), were reclassified as "infusion units." Only one of the ten projects, the Environmental Education Program, could be considered as a "program" as defined in the review format section of this part of the report. Nine of the ten projects yielded infusion units on related but not hierarchically developed marine/aquatic content.

B. Program Characteristics

Descriptive information provided on the individual project review sheet (see yellow pages), indicated that the Environmental Education Program possessed all four program characteristics. Other projects which produced infusion units also possessed one or more of the four program characteristics. The respective characteristics were checked and relabeled as "project" characteristics.

C. Unit Characteristics

Information regarding relevant instructional characteristics of project units will be presented and discussed in the remainder of this section. The six relevant characteristics categories include the content/skill focus, teacher materials, student materials, the objectives-instruction relationship, assessment materials and characteristics, and field experiences. Again, it should be noted that information concerning "Project CAPE" and "NET Basics Program" is based on a limited sample of project units.

Content/Skill Focus

Descriptions of the content/skill focus of the projects comprise several specific types. There are three kinds of content foci. A "marine information" focus emphasizes the recall of specific marine content (e.g., identifying and
remembering information about marine organisms). A second type of content focus involves "ecology concepts." The Environmental Education Program, for example, was developed around a hierarchy of ecological concepts. That is, concepts regarding organisms, adaptations, habitats, environmental factors, communities, and ecosystems are the focus of the learning. Specific information is secondary in emphasis and is used in examples or to elaborate the concepts being developed. The third type of the content focus involves "basic concepts" of a cognitive nature. For example, "Sensing the Sea," two well-developed primary units (K-3), was designed to use marine experiences to develop basic concepts such as color, size, shape, texture, quantity, etc.

An "inquiry skills" focus is evident when a stated and major emphasis of instruction is on developing inquiry process skills (see Section 2B of review format). Inquiry skills seemed to be a focus of two projects, "Sensing the Sea" and "NEM Basics Program."

More than half of the projects reviewed developed units which were information oriented. One project developed units which emphasized ecological relationships conceptually and two emphasized inquiry process skills. It should be noted that no particular focus is inherently better than another. Each focus, however, should be related to the goals and purposes of the marine education program.

Teacher Materials (Teacher Support)

As mentioned previously, the amount of information and support provided through well-organized teacher materials is a critical key to student learning. The degree of teacher support, as discerned by reviewing the teachers' guides, was estimated and indicated by a value on a ten-point scale which represents
eight relevant teacher support characteristics. The characteristics taken from Section 2C of the review format and the point-value of each characteristic are listed below.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Points</th>
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<tbody>
<tr>
<td>(1) instructional objectives</td>
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</tr>
<tr>
<td>(2) teacher background information</td>
<td>1</td>
</tr>
<tr>
<td>(3) glossary of terms/concepts</td>
<td>1</td>
</tr>
<tr>
<td>(4) lesson preparation information</td>
<td>1</td>
</tr>
<tr>
<td>(5) lesson plans (1 = implicit, 2 = moderately explicit, 3 = highly explicit)</td>
<td>1-3</td>
</tr>
<tr>
<td>(6) references to other resources</td>
<td>1</td>
</tr>
<tr>
<td>(7) classroom management information</td>
<td>1</td>
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<tr>
<td>(8) follow-up enrichment activities</td>
<td>1</td>
</tr>
</tbody>
</table>

Lesson plan points were assigned as follows:

```
1 point  2 points  3 points
lesson plans:  highly implicit  highly explicit
```

The total number of points of the characteristics comprises a unit "score." The scores for all primary units (grades K-3) are averaged. The value in the primary level column represents the average number of teacher support characteristic points of the primary units of the project. The same averaging process is used for upper elementary units (grades 4-6).

-----------------------------
Insert Table 5 about here
-----------------------------

The data in Table 5 indicate that teacher materials from the ORCA project and "Sensing the Sea," provide the most teacher support. Teacher materials from the Environmental Education Program, Project CAPE, WET Basics Program, and the primary units of the Alaska Sea Week Curriculum Series provide moderate teacher
support while the remaining teacher materials reviewed provide less support. Caution should be exercised in placing value judgements on support scores and score groups. No one score is inherently "better" than another. The key idea concerning all information provided in this section of the report, is that of "appropriateness" within a given situational context. For example, if the teachers who will be using the materials are knowledgeable about marine/aquatic ecological concepts, relationships and information and have experience in science teaching, then teacher materials with moderate support may suffice. However, if teachers have meager ecological content backgrounds and little experience in teaching science (involving activities, live organisms, etc.) then teachers' guides with much support can greatly enhance the quality of instruction and the degree of student learning. Thus, the amount of teacher support needed varies with the characteristics of the teachers who will be using the materials.

Student Materials

The scores in the "student materials" column in Table 6 represent the total number of components and characteristics present in the student materials reviewed for primary and upper elementary grades (see review format, Section 2D). Because five characteristics were considered, the total possible number of points is 5. The number of points represent a gross estimate of the amount of student materials development. Therefore, one could infer that the higher point value indicates more developed student materials.

Insert Table 6 about here

The data in the table above indicate that four of the ten projects reviewed contained no distinct, prepared student materials. Three projects, ORCA, Project CAPE, and the Alaska Sea Week Project (K-3) produced more developed student
materials. These materials merit further consideration and the ORCA student materials, in particular, could serve as a model for those interested in student material development.

Objectives-Instruction Relationship (Instructional Validity)

The degree of the relationship between the stated objectives and the content and skills of the instructional activities or "instructional validity" is represented by the average rating across primary units and upper elementary units (see Section 2H). These mean ratings are shown in Table 7.

Insert Table 7 about here

The data above indicate that at least half of the units are highly related or instructionally valid at both lower and upper elementary levels. The units of three more projects are "somewhat" or moderately related. This instructional characteristic is an extremely important one. "Teaching what's supposed to be taught" is a basic educational tenet.

Assessment Materials and Characteristics

The content validity of materials or strategies developed to assess student learning are indicated by points in Table 8. The point values represent a) the presence of strategies and/or written tests and b) the average degree of content validity (see Section 2H). The higher point values indicate a closer relationship between the content and skills stated in the objectives and the content and skills of the assessment items.

Insert Table 8 about here

It appears that units from three projects, Environmental Education Program
and "Sensing the Sea" and upper elementary Project COAST units contained assessment materials possessing a greater degree of content validity. That is, the assessment items in these project materials are more highly related to stated objectives than the assessment items in other project units. Three projects did not appear to develop any student assessment materials. The WET Basics Program developed written tests, however, copies of these assessment instruments were not available for review.

Field Experiences

Field experiences were handled in a variety of ways by the instructional developers. All of these merit consideration. The development of field experiences for youngsters depends on a number of factors: the existence of established environmental or marine educational centers, the proximity of field sites, the availability of field trained resource people, teacher training and financial constraints.

Planning, developing resource materials (information, activities), and conducting field trips are three phases of the field experiences development-implementation process. These can be done by environmental center staff, by teachers or by other field consultants, individually or in collaboration. Figure 1 shows various relationships between the phases of the development-implementation process and the people who could participate in the process.

Insert Figure 1 about here

The most plausible non-interactive and interactive planning, development and implementation patterns are shown in Table 9. Each of the three phases is separated by arrows. Persons participating in each phase are indicated by letters (refer to Figure 1). Interactive efforts are indicated by combinations of
letters within parentheses. The more common patterns emerging from this review are labeled with asterisks (*).

----------------------------------
| Insert Table 9 about here |
----------------------------------

In reality, the key person/s/ in the field experience process are those who actually conduct the field trips. Table 10 provides summary information regarding the type of person who was most responsible for conducting field experiences in the projects reviewed.

----------------------------------
| Insert Table 10 about here |
----------------------------------

Of the field experiences described in the instructional units, two basic types of people conducted field trips: environmental education center staff in localities that had established such centers and individual teachers. From the data above, it was evident that two projects clearly developed field experiences to be conducted at their local environmental centers. The experiences were planned as an integral part of the program. Patterns 1 and 7 in Table 9 seem to best describe the development and implementation of the field experiences. Five of the projects relied on the teacher to conduct the field experiences and resources and information of varying amounts were provided in the teacher's guide. Patterns 4, 8, 9 and 10 best describe the development/implementation process of these projects. Unfortunately, due to the lack of more specific information, it is impossible to match specific patterns with particular projects.

Field experiences can make the learning of ecological concepts and relationships real and meaningful to students. They are often the kind of learning experience which can foster the development of values and positive attitudes regarding marine and aquatic environments. The utility of the model and develop-
ment/implementation patterns just discussed, lies in its application in the instructionally development process. Often teachers must be relied on to conduct class field trips. Many elementary teachers are not prepared to do this. Seven patterns in Table 9 above distinguish alternative approaches to the development of field experiences conducted by teachers. The consideration of these approaches may help unit developers clarify what people resources are available and/or need to plan and develop high quality field experiences for teachers and youngsters.

D. Exemplary Components of Particular Project Units

The units of all projects reviewed are resources for marine education program and instructional developers in South Carolina. Some project units, however, possess components which are particularly well-developed from an instructional perspective and can serve as models for local development efforts.

The unit content of projects developed in the southeastern region is understandably appropriate for South Carolina youngsters. Two levels are involved in the determination of content appropriateness. First, the concepts and ecological relationships in a unit are generalizable and abstract. They are not region dependent. Second, information about particular marine organisms and environments can be (a) selected as examples or vehicles to provide a specific context for learning the concepts and relationships or (b) learned solely as specific information. Thus, while the first type of content is applicable across environments and organisms, the second type of content is specific and environment-bound. For example, the ORCA project produced a unit, "The Life Cycle of a Salmon" which was well-developed. The specific marine organism, the salmon, is not relevant for the South Carolina region; however, the concept of "life cycle" is generalizable across regions. Therefore, this unit merits further review and could serve as a good model for a unit on life cycles. South Carolina developers may wish to adapt the specific marine content of the unit to focus on the life cycle of shrimp, an important coastal organism in this region.
The ecological concepts/relationships approach of the Environmental Education Program is especially noteworthy. Much of the specific marine content is also appropriate for the South Carolina locale. Project CAPE and Project COAST and "Sensing the Sea" have a different focus but are also based on generalized and specific content which is appropriate for the South Carolina region. However, if any well-developed unit is based on generalizable concepts or relationships deemed relevant by the user, then the specific content can always be adapted to include marine organisms and environments which better represent the locale of the user.

The format of the teacher guides of the ORCA project are worth modeling. The Alaska Sea Week Project teacher guides (K-3) are also worthy of further consideration. In these guides, teachers are not simply told to discuss a concept but instead are provided with questions and specific explanations about what to discuss and how to discuss it. This explicit approach is helpful for the teacher who is inexperienced with regard to marine ecology.

The student materials of ORCA and Project CAPE are exemplary and would serve as good models of attractive, well-developed student materials.

Although the slides themselves were not available for review, the scripts and organization of the slide presentations of the Environmental Education Program are well-designed. The production of such presentations is an excellent way to standardize and assure a degree of quality regarding the presentation of marine information. Slide-tape presentations are an effective bimodal learning approach for elementary youngsters. Well-written scripts can incorporate the expertise of marine consultants. Most of all, however, slide-tape presentations provide additional support for the elementary teacher who may feel somewhat hesitant about teaching a unit about which she/he has little background information or experience.

The Northern New England Marine Education Project (NNE MEP) contains noteworthy and basic information and resources for field trips and can serve as a good model
for focusing on what to look for at the shore.

The Project COAST unit, "Utilization of Estuarine Organisms", is a well-organized unit which integrates the ecological, cultural and historical aspects of the coastal areas. The cultural background information for teachers is excellent and could serve as a standard. The slide approach is well-done.

In summary, then, projects have developed units with varying components and characteristics. While some units are more developed than others, the desirability or value of any unit is dependent on the goals and objectives of the user. Several cautions should be made regarding the preceding comments about exemplary development efforts and products. Care should be taken to refrain from overgeneralizing from the information provided. For example, the formats of teacher materials of the ORCA Project are lauded. The quality of the format should not be generalized to the content of the materials or the quality of the activities.

The user of this report is encouraged to read the specific comments in the individual reviews of the projects. The judgement of the quality of the activities or selection of content, etc. is the prerogative of the user. We reiterate that what we have tried to do here is to provide descriptive information and some comments from a science curriculum and instructional development perspective. Hopefully, we have made it easier for interested South Carolina and other marine educators to obtain the kind of information needed at the preliminary design phase of the program development efforts.
Table 1.—Responses to direct mailings by target groups

<table>
<thead>
<tr>
<th>TARGET GROUP</th>
<th>No. of Letters Sent</th>
<th>No. of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Appointed state marine education coordinators</td>
<td>47</td>
<td>11 (23%)</td>
</tr>
<tr>
<td>2. Sea Grant Institutions/ Consortia</td>
<td>53</td>
<td>21 (40%)</td>
</tr>
<tr>
<td>3. Marine/aquatic agencies - organizations in SE region</td>
<td>19</td>
<td>8 (42%)</td>
</tr>
<tr>
<td>4. Federal agencies with marine interests</td>
<td>7</td>
<td>2 (29%)</td>
</tr>
<tr>
<td>5. Private, non-profit organizations (outside the SE region) with marine/aquatic interests</td>
<td>9</td>
<td>4 (44%)</td>
</tr>
<tr>
<td>6. Other schools, agencies that have developed marine materials</td>
<td>6</td>
<td>5 (83%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>151</td>
<td>51 (36%)</td>
</tr>
</tbody>
</table>
Table 2.--Number of types of responses by target groups

<table>
<thead>
<tr>
<th>TYPES OF RESPONSES</th>
<th>TARGET GROUPS</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
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<tr>
<td>a. Fully-developed marine education program</td>
<td>--</td>
</tr>
<tr>
<td>b. Marine education goals/objectives</td>
<td>1</td>
</tr>
<tr>
<td>c. Instructional units on marine topics</td>
<td>1</td>
</tr>
<tr>
<td>d. Brochures, booklets and/or audio-visual programs on special marine topics</td>
<td>1</td>
</tr>
<tr>
<td>e. Personal recommendations or references to marine education materials developed by other people/institutions</td>
<td>6</td>
</tr>
<tr>
<td>f. No available marine/aquatic educational materials for grades K-6</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 3.--Summary of basic project information

<table>
<thead>
<tr>
<th>PROJECTS REVIEWED</th>
<th>Grade Levels</th>
<th>Funds</th>
<th>Date</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alaska Sea Week Curriculum Series</td>
<td>K-6</td>
<td>State/Sea Grant</td>
<td>1980</td>
<td>Infusion Units</td>
</tr>
<tr>
<td>Univ. of Alaska Sea Grant College</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Coastal/Oceanic Awareness Studies</td>
<td>K-12</td>
<td>Sea Grant</td>
<td>1974+</td>
<td>Infusion Units</td>
</tr>
<tr>
<td>(Project COAST) Univ. of Delaware</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Environmental Education Program</td>
<td>K-6</td>
<td>ESEA Title III</td>
<td>1976</td>
<td>Program</td>
</tr>
<tr>
<td>(Martin County, Florida)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Duvall County, Florida)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Northern New England Marine Education Project</td>
<td>K-6</td>
<td>Sea Grant</td>
<td>1978</td>
<td>Infusion Units</td>
</tr>
<tr>
<td>Univ. of Maine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Ocean In Your Classroom</td>
<td>K-6</td>
<td>?</td>
<td>1975</td>
<td>Infusion Units</td>
</tr>
<tr>
<td>Falmouth Schools/Mass. Ext. Serv.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Ocean Related Curricular Activities</td>
<td>3-6+</td>
<td>?</td>
<td>1980</td>
<td>Infusion Units</td>
</tr>
<tr>
<td>(ORCA) Pacific Science Center</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Project CAPE</td>
<td>K-6</td>
<td>ESEA Title IVC</td>
<td>1980+</td>
<td>Infusion Units</td>
</tr>
<tr>
<td>Dare County, North Carolina</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Sensing the Sea</td>
<td>K-3</td>
<td>Sea Grant</td>
<td>1978</td>
<td>Infusion Units</td>
</tr>
<tr>
<td>Virginia Inst. of Marine Sci.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. WET Basics Program</td>
<td>K-6</td>
<td>ESEA Title IVC</td>
<td>1980+</td>
<td>Infusion Units/Activities</td>
</tr>
<tr>
<td>Falmouth Schools/Mass. Ext. Serv.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.—Summary of the content/skill focus of projects reviewed

<table>
<thead>
<tr>
<th>PROJECTS REVIEWED</th>
<th>CONTENT/SKILL FOCUS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(K-3)</td>
</tr>
<tr>
<td></td>
<td>(4-6)</td>
</tr>
<tr>
<td>1. Alaska Sea Week Curriculum Series</td>
<td>inquiry</td>
</tr>
<tr>
<td>Univ. of Alaska Sea Grant College</td>
<td>marine skills</td>
</tr>
<tr>
<td></td>
<td>information</td>
</tr>
<tr>
<td>2. Coastal/Oceanic Awareness Studies</td>
<td>variable</td>
</tr>
<tr>
<td>(Project COAST) Univ. of Delaware</td>
<td>variable</td>
</tr>
<tr>
<td>3. Environmental Education Program</td>
<td>ecology concepts</td>
</tr>
<tr>
<td>(Martin County, Florida)</td>
<td>ecology concepts,</td>
</tr>
<tr>
<td></td>
<td>relationships</td>
</tr>
<tr>
<td>4. Marine Science</td>
<td>marine</td>
</tr>
<tr>
<td>(Duval County, Florida)</td>
<td>marine information</td>
</tr>
<tr>
<td>5. Northern New England Marine Education Project, Univ.</td>
<td>marine</td>
</tr>
<tr>
<td>of Maine</td>
<td>marine information</td>
</tr>
<tr>
<td>6. Ocean In Your Classroom</td>
<td>marine</td>
</tr>
<tr>
<td>Falmouth Schools/Mass. Ext. Serv.</td>
<td>marine information</td>
</tr>
<tr>
<td>7. Ocean Related Curricular Activities (ORCA) Pacific</td>
<td>marine</td>
</tr>
<tr>
<td>Science Center</td>
<td>marine information</td>
</tr>
<tr>
<td>8. Project CAPE</td>
<td>marine</td>
</tr>
<tr>
<td>Dare County, North Carolina</td>
<td>marine information</td>
</tr>
<tr>
<td>9. Sensing the Sea</td>
<td>basic concepts/</td>
</tr>
<tr>
<td>Virginia Inst. of Marine Science</td>
<td>inquiry skills</td>
</tr>
<tr>
<td>10. WET Basics Program</td>
<td>inquiry skills</td>
</tr>
<tr>
<td>Falmouth Schools/Mass. Ext. Serv.</td>
<td>inquiry skills</td>
</tr>
</tbody>
</table>
Table 5.—Summary of the degree of teacher support of projects reviewed

<table>
<thead>
<tr>
<th>PROJECTS REVIEWED</th>
<th>DEGREE OF TEACHER SUPPORT *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(K-3)</td>
</tr>
<tr>
<td>1. Alaska Sea Week Curriculum Series</td>
<td>7.8</td>
</tr>
<tr>
<td>2. Coastal/Oceanic Awareness Studies (Project COAST) Unv. of Delaware</td>
<td>5.3</td>
</tr>
<tr>
<td>3. Environmental Education Program (Martin County, Florida)</td>
<td>6.0</td>
</tr>
<tr>
<td>4. Marine Science (Duvall County, Florida)</td>
<td>4.7</td>
</tr>
<tr>
<td>5. Northern New England Marine Education Project, Univ. of Maine</td>
<td>3.5</td>
</tr>
<tr>
<td>6. Ocean In Your Classroom Falmouth Schools/Mass. Ext. Serv.</td>
<td>3.0</td>
</tr>
<tr>
<td>7. Ocean Related Curricular Activities (ORCA) Pacific Science Center</td>
<td>10.0</td>
</tr>
<tr>
<td>8. Project CAPE Dare County, North Carolina</td>
<td>5.5</td>
</tr>
<tr>
<td>9. Sensing the Sea Virginia Inst. of Marine Sci.</td>
<td>9.0</td>
</tr>
<tr>
<td>10. WET Basics Program Falmouth Schools/Mass. Ext. Serv.</td>
<td>6.0</td>
</tr>
</tbody>
</table>

* 10 point scale (see report for characteristics and point values)
Table 6.--Summary of the degree of student materials development of projects reviewed

<table>
<thead>
<tr>
<th>PROJECTS REVIEWED</th>
<th>DEGREE OF STUDENT MATERIALS DEVELOPMENT*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(K-3)</td>
</tr>
<tr>
<td>1. Alaska Sea Week Curriculum Series</td>
<td>4</td>
</tr>
<tr>
<td>Univ. of Alaska Sea Grant College</td>
<td></td>
</tr>
<tr>
<td>2. Coastal/Oceanic Awareness Studies</td>
<td>---</td>
</tr>
<tr>
<td>(Project COAST) Univ. of Delaware</td>
<td></td>
</tr>
<tr>
<td>3. Environmental Education Program</td>
<td>3</td>
</tr>
<tr>
<td>(Martin County, Florida)</td>
<td></td>
</tr>
<tr>
<td>4. Marine Science</td>
<td>--</td>
</tr>
<tr>
<td>(Duval County, Florida)</td>
<td></td>
</tr>
<tr>
<td>5. Northern New England Marine Education</td>
<td>--</td>
</tr>
<tr>
<td>Project, Univ. of Maine</td>
<td></td>
</tr>
<tr>
<td>6. Ocean In Your Classroom</td>
<td>1</td>
</tr>
<tr>
<td>Falmouth Schools/Mass. Ext. Serv.</td>
<td></td>
</tr>
<tr>
<td>7. Ocean Related Curricular Activities</td>
<td>5</td>
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<tr>
<td>(ORCA) Pacific Science Center</td>
<td></td>
</tr>
<tr>
<td>8. Project CAPE</td>
<td>4</td>
</tr>
<tr>
<td>Dare County, North Carolina</td>
<td></td>
</tr>
<tr>
<td>9. Sensing the Sea</td>
<td>1</td>
</tr>
<tr>
<td>Virginia Inst. of Marine Sci.</td>
<td></td>
</tr>
<tr>
<td>10. WET Basics Program</td>
<td>--</td>
</tr>
<tr>
<td>Falmouth Schools/Mass. Ext. Serv.</td>
<td></td>
</tr>
</tbody>
</table>

* 5 point scale (see Part 2, Section D of review sheet for student material characteristics)

--- No distinct student materials included in unit

NA - Not applicable, no units developed and/or reviewed for these grades
Table 7.—Summary of the degree of the relationship between objectives and instruction (instructional validity) of the projects reviewed

<table>
<thead>
<tr>
<th>PROJECTS REVIEWED</th>
<th>DEGREE OF INSTRUCTIONAL VALIDITY*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(K-3)</td>
</tr>
<tr>
<td>1. Alaska Sea Week Curriculum Series</td>
<td>3.8</td>
</tr>
<tr>
<td>Univ. of Alaska Sea Grant College</td>
<td></td>
</tr>
<tr>
<td>2. Coastal/Oceanic Awareness Studies (Project COAST)</td>
<td>2.0</td>
</tr>
<tr>
<td>Univ. of Delaware</td>
<td></td>
</tr>
<tr>
<td>3. Environmental Education Program (Martin County, Florida)</td>
<td>4.0</td>
</tr>
<tr>
<td>4. Marine Science (Duval County, Florida)</td>
<td>3.0</td>
</tr>
<tr>
<td>5. Northern New England Marine Education Project, Univ. of Maine</td>
<td>2.0</td>
</tr>
<tr>
<td>6. Ocean in Your Classroom Falmouth Schools/Mass. Ext. Serv.</td>
<td>3.3</td>
</tr>
<tr>
<td>7. Ocean Related Curricular Activities (ORCA) Pacific Science Center</td>
<td>4.0</td>
</tr>
<tr>
<td>8. Project CAPE Dare County, North Carolina</td>
<td>4.0</td>
</tr>
<tr>
<td>9. Sailing the Sea Virginia Inst. of Marine Sci.</td>
<td>4.0</td>
</tr>
<tr>
<td>10. WET Basics Program Falmouth Schools/Mass. Ext. Serv.</td>
<td>4.0</td>
</tr>
</tbody>
</table>

* 4 point scale (4-highly related, 3-somewhat related, 2-vaguely related, 1-not related)
Table 8.--Summary of the degree of content validity of the assessment items of student learning of the projects reviewed

<table>
<thead>
<tr>
<th>PROJECTS REVIEWED</th>
<th>CONTENT VALIDITY OF ASSESSMENT*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(K-3)</td>
</tr>
<tr>
<td>1. Alaska Sea Week Curriculum Series Univ. of Alaska Sea Grant College</td>
<td>--***</td>
</tr>
<tr>
<td>2. Coastal/Oceanic Awareness Studies (Project COAST) Univ. of Delaware</td>
<td>2.0</td>
</tr>
<tr>
<td>3. Environmental Education Program (Martin County, Florida)</td>
<td>4.0</td>
</tr>
<tr>
<td>4. Marine Science (Duvall County, Florida)</td>
<td>3.0</td>
</tr>
<tr>
<td>5. Northern New England Marine Education Project, Univ. of Maine</td>
<td>--</td>
</tr>
<tr>
<td>6. Ocean In Your Classroom Falmouth Schools/Mass. Ext. Serv.</td>
<td>--</td>
</tr>
<tr>
<td>7. Ocean Related Curricular Activities (ORCA) Pacific Science Center</td>
<td>3.0</td>
</tr>
<tr>
<td>8. Project CAPE Dare County, North Carolina</td>
<td>2.5</td>
</tr>
<tr>
<td>9. Sensing the Sea Virginia Inst. of Marine Sci.</td>
<td>4.0</td>
</tr>
<tr>
<td>10. WET Basics Program Falmouth Schools/Mass. Ext. Serv.</td>
<td>--</td>
</tr>
</tbody>
</table>

* 4 point scale (4--highly valid, 3--somewhat valid, 2--vaguely valid, 1--not valid)

-- No assessment materials included in unit

NA Not applicable, no units developed and/or reviewed for these grades
Table 9.--Field experience development/implementation patterns

<table>
<thead>
<tr>
<th>NON-INTERACTIVE PATTERNS</th>
<th>INTERACTIVE PATTERNS</th>
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</thead>
<tbody>
<tr>
<td>* 1) A → D → G</td>
<td>* 7) (A-B) → D → G</td>
</tr>
<tr>
<td>2) A → D → H</td>
<td>* 8) (A-B) → (D-E) → H</td>
</tr>
<tr>
<td>* 3) B → E → H</td>
<td>* 9) (B-C) → (E-F) → H</td>
</tr>
<tr>
<td>* 4) B → D → H</td>
<td>* 10) (A-B-C) → (D-E-F) → H</td>
</tr>
<tr>
<td>5) B → F → H</td>
<td></td>
</tr>
<tr>
<td>6) C → F → I</td>
<td></td>
</tr>
</tbody>
</table>

* Most commonly observed patterns in projects reviewed
Table 10.—Summary of person/s/ conducting field trips in projects reviewed

<table>
<thead>
<tr>
<th>PROJECTS REVIEWED</th>
<th>PERSON/S/ CONDUCTING FIELD TRIPS</th>
</tr>
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<tbody>
<tr>
<td>1. Alaska Sea Week Curriculum Series</td>
<td>Teacher</td>
</tr>
<tr>
<td>Univ. of Alaska Sea Grant College</td>
<td></td>
</tr>
<tr>
<td>2. Coastal/Oceanic Awareness Studies</td>
<td>Teacher</td>
</tr>
<tr>
<td>(Project COAST) Univ. of Delaware</td>
<td></td>
</tr>
<tr>
<td>3. Environmental Education Program</td>
<td>Environmental Center Staff</td>
</tr>
<tr>
<td>(Martin County, Florida)</td>
<td></td>
</tr>
<tr>
<td>4. Marine Science</td>
<td>Environmental Center Staff</td>
</tr>
<tr>
<td>(Duval County, Florida)</td>
<td></td>
</tr>
<tr>
<td>5. Northern New England Marine Education Project</td>
<td>Teacher</td>
</tr>
<tr>
<td>Univ. of Maine</td>
<td></td>
</tr>
<tr>
<td>6. Ocean In Your Classroom</td>
<td>Teacher</td>
</tr>
<tr>
<td>Falmouth Schools/Mass. Ext. Serv.</td>
<td></td>
</tr>
<tr>
<td>7. Ocean Related Curricular Activities</td>
<td>Teacher</td>
</tr>
<tr>
<td>(ORCA) Pacific Science Center</td>
<td></td>
</tr>
<tr>
<td>8. Project CAPE</td>
<td>Teacher</td>
</tr>
<tr>
<td>Dare County, North Carolina</td>
<td></td>
</tr>
<tr>
<td>9. Sensing the Sea</td>
<td>---</td>
</tr>
<tr>
<td>Virginia Inst. of Marine Sci.</td>
<td></td>
</tr>
<tr>
<td>10. WET Basics Program</td>
<td>Teacher</td>
</tr>
<tr>
<td>Falmouth Schools/Mass. Ext. Serv.</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1.--Person/s involved in the development and implementation of field experience activities
Appendix A

Search Letter
Dear

The South Carolina Sea Grant Consortium and educators in the state are beginning the process of improving the quality of marine education in the schools. We are involved in the first phase of this endeavor which has as its purpose the nationwide search and review of existing marine education curricular and instructional materials for students in kindergarten through grade 6. More specifically, we are searching for the following:

- a. fully-developed marine education programs
- b. marine education goals and objectives
- c. instructional units on marine topics often embedded in environmental education programs
- d. brochures, booklets, and audio-visual programs on marine topics
- e. personal recommendations of and references to marine education materials developed by other institutions.

Our conception of marine education includes both fresh and salt water properties and environments. Also, while kindergarten through grade 6 is our major focus, we would appreciate information on materials suitable for grades 7-12.

We would like to include materials which your organization may have developed or those to which you can refer us. Please send us lists, descriptions and ordering information regarding any of the types of materials mentioned above.

Your prompt reply will be greatly appreciated. Our review will be available as a comprehensive report in July 1981. If you inform us of your interest in this report, we will be happy to provide you with ordering information.

Thank you in advance for your consideration and assistance.

Sincerely,

Wendy Allen
Wendy Allen, Project Coordinator
Baruch Institute for Marine and Coastal Research and the Dept. of Continuing Education
Appendix B
Response Form
B.1

CONTACT PERSON:  

ORGANIZATION:  

ADDRESS:  

PHONE:  

[SOURCE: 1 2 3 4 5]

Date

1. LETTER OF INQUIRY

2. RESPONSE

   — a. Fully-developed marine education programs
   — b. Marine education goals/objectives
   — c. Instructional units on marine topics
   — d. Brochures, booklets, and/or audio-visual programs on special marine topics
   — e. Personal recommendations of or references to marine education materials developed by other institutions (see comments below)

3. SAMPLE MATERIALS ORDERED

   Title: ____________________________  
   Order No.: ______________________ Cost: $______________________

   Title: ____________________________  
   Order No.: ______________________ Cost: $______________________

4. COMMENTS
Appendix C

Marine Education Resources for Educators
Marine Education Resources for Educators

Some of the different sources of information on the world of water are listed and briefly described below.

1. National Sea Grant Depository

University of Rhode Island
Pell Marine Science Library
Narragansett Bay Campus
Narragansett, RI 02882

(402)792-6114

The Depository contains every Sea Grant document that has been published since 1968. Computer searches for particular types of materials are conducted free of charge. A free loan system is also offered by the Depository.

2. Marine Education Materials System (MEMS)

This system contains over 1400 marine education materials on microfiche. Several states have a MEMS center. Computer searches are conducted for a nominal fee at the MEMS center in Virginia. Persons interested in having a search done should contact:

Susan Gammisch
Coordinator, Marine Education Center and MEMS
Virginia Institute of Marine Science
Gloucester Point, VA 23062

(804)642-2111

The nearest MEMS resource center for South Carolinians is located in Georgia:

Sea Grant Program
Ecology Building
University of Georgia
Athens, GA 30602

(404)542-7671

3. Sea Grant Programs

Most states have Sea Grant programs with marine research, education and advisory components. Many Sea Grant Institutions and Consortia publish and
disseminate newsletters and other materials to interested persons. Educators in South Carolina can contact the South Carolina Sea Grant Consortium for information about its program:

SC Sea Grant Consortium
221 Fort Johnson Rd.
James Island
Charleston, SC 29412

(803)795-9650

Other Sea Grant programs are listed with their addresses, alphabetically by state, at the end of this section.

4. Marine Education Associations

The National Marine Education Association (NMEA) is comprised of school teachers, museum curators, naturalists and scientists interested in sharing their knowledge and enthusiasm for the world of water. Members of NMEA gather to exchange ideas and resource materials once a year at a national conference. Members also receive Current - The Journal of Marine Education four times a year. Membership dues are $8.00 a year and can be sent to:

National Marine Education Association
Attn: Membership
Gloucester Point, VA 23062

In addition to the NMEA, several regional and state marine education associations have been formed. Interested persons in South Carolina may want to join the Georgia Association of Marine Educators (GAME). The dues are $8.00/year and include membership in NMEA. For further information, write to:

Georgia Association for Marine Education
1032 Wildwood Road
Atlanta, GA 30306

5. Journals

Several journals provide non-technical information on the aquatic world including, the aforementioned Current - The Journal of Marine Education; Oceans, the publication of the Cousteau Society; and Oceanus, which is published by the Woods Hole Oceanographic Institution.
6. **Scientific Organizations**

Educators need to keep informed concerning the most current scientific findings about the aquatic environment. Many scientific organizations hold meetings and publish proceedings, both of which could serve as valuable resources for educators. The Estuarine Research Federation (ERF) and its several regional affiliates, including the Southeastern Estuarine Research Society (SEERS) and the Atlantic Estuarine Research Society (AERS), offer programs that can keep educators as well as scientists abreast of current research findings on coastal ecosystems.
Sea Grant Programs

Alaska Sea Grant Program
University of Alaska
Fairbanks, AL 99701

Sea Grant College Program, A-032
University of California
La Jolla, CA 92039

University of Southern California
Sea Grant Program
SSW 300
Los Angeles, CA 90007

California Sea Grant Marine
Advisory Program
554 Hutchison Hall
University of California
Davis, CA 95616

Marine Advisory Service
University of Connecticut
322 N. Main St.
Wallingford, CT 06492

Delaware Sea Grant College Program
College of Marine Studies
University of Delaware
Newark, DE 19711

Florida Sea Grant College
G022 McCarty Hall
University of Florida
Gainesville, FL 32611

Sea Grant Program
Ecology Building
University of Georgia
Athens, GA 30602

University of Hawaii Sea Grant
College Program
Spalding 253
2540 Maile Way
Honolulu, HI 96822

Louisiana Sea Grant College Program
Center for Wetland Resources
Louisiana State University
Baton Rouge, LA 70803

Maine Sea Grant Publications
30 Coburn Hall
University of Maine
Orono, ME 04469

Sea Grant College Program
University of Maryland
College Park, MD 20742

Sea Grant Program
Massachusetts Institute of Technology
77 Massachusetts Ave.
Cambridge, MA 02139

Sea Grant Program
Woods Hole Oceanographic Institution
Woods Hole, MA 02543

Michigan Sea Grant Program
University of Michigan
2200 Bonisteel Blvd.
Ann Arbor, MI 48109

Information Services
109 Agriculture Hall
Michigan State University
East Lansing, MI 48824

Sea Grant Extension Program
103 Washburn Hall
University of Minnesota-Duluth
Duluth, MN 55812

Minnesota Sea Grant Program
435 Animal Science and Veterinary Medicine
1988 Fitch Ave.
St. Paul, MN 55108

Mississippi/Alabama Sea Grant
Consortium
PO Drawer AG
Ocean Springs, MS 39564

New England Marine Advisory Service
Administration Building
New England Center
Durham, NH 03824

Marine Advisory Program
Marine Program Building
University of New Hampshire
Durham, NH 03824

Marine Advisory Service
45 Pleasant St.
Portsmouth, NH 03801
New Jersey Marine Advisory Service
Department of Environmental Resources
Box 231
Cook College, Rutgers University
New Brunswick, NJ 08903

New Jersey Marine Sciences Consortium
Princeton Forrestal Center
101 College Rd. East
Princeton, NJ 08540

New York Sea Grant Institute
State University of New York
411 State St.
Albany, NY 12246

Sea Grant Extension Program
Fernow Hall
Cornell University
Ithaca, NY 14853

Sea Grant College Program
105 1911 Building
North Carolina State University
Raleigh, NC 27650

Ohio Sea Grant Extension Program
Ohio State University
434 West 12th Ave.
Columbus, OH 43210

Sea Grant Communications
AdS, A418
Oregon State University
Corvalis, OR 97331

Sea Grant Program
Department of Marine Science
University of Puerto Rico
Mayaguez, PR 00708

Marine Advisory Service
University of Rhode Island
Narragansett, RI 02882

South Carolina Sea Grant Consortium
221 Fort Johnson Rd.
James Island
Charleston, SC 29412

Sea Grant College Program
Texas A&M University
College Station, TX 77843

Sea Grant Advisory Services
Virginia Institute of Marine Science
Gloucester Point, VA 23062

Marine Advisory Program
Department of Food Science and Technology
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

Washington Sea Grant Communications
Division of Marine Resources
University of Washington, HG-30
3716 Brooklyn Ave. NE
Seattle, WA 98195

University of Wisconsin Sea Grant Program
1800 University Ave.
Madison, WI 53706
APPENDIX D

Vitae of the Reviewers
VITA

Jeanne M. Liu

Office of Research
Department of Education
Rutledge Building
Columbia, SC 29201

EDUCATION HISTORY

1976 - University of South Carolina, Columbia, SC
Educational Research, Instructional Psychology
PH.D. (expected 12-81)

1973-75 University of South Carolina, Columbia, SC
Elementary Education
M.Ed.

1967-71 Michigan State University, East Lansing, MI
Educational Psychology

1963-65 University of Wisconsin, Madison, WI
Elementary Education, English
B.S.(B.Ed.)

1961-63 University of Hawaii at Manoa, Honolulu, HI
Elementary Education (Ford Foundation Program)

PROFESSIONAL EXPERIENCE

1981 - Education Program Specialist, Office of Research
South Carolina State Department of Education

1979-81 Instructor and Screening Examination Program Coordinator,
College of Education, University of South Carolina

1977-79 Graduate Research Assistant, Screening Examination Program,
College of Education, University of South Carolina

1976-77 Instructor, College of Education, University of South Carolina
Undergraduate courses taught:

EDPY 333 Child Growth and Development
EDPY 335 Educational Psychology

1975-76 Teaching Assistant, College of Education, University of South Carolina
Graduate course taught:

EDCI 725 Principles of Curriculum Construction

1973-75 Teaching Associate, Science-Mathematics Curriculum
Specialist, Cooperative Model Schools Project, College of
Education, University of South Carolina

1966-72 Teacher, East Lansing Public Schools, Michigan
Science-Mathematics: fifth, sixth and seventh grades; science
department chairperson (1969-72)
OTHER PROFESSIONAL ACTIVITIES

Chairperson, AERA/NMCE Symposium: Approaches to Test Design for the Assessment of the Effectiveness of Educational Programs. Boston, 1980.

Appointed member, Elementary Science Committee, State Department of Education, South Carolina, 1975-76.

Invited participant, NSF Teacher Training Institutes, 1969-70: Science Curriculum Improvement Study (SCIS) and Mathematics Teachers Institute of Michigan State University, Intermediate Science Curriculum Study (ISCS) at the University of Maryland.

Teacher consultant, California Achievement Test revision team, Michigan State University, East Lansing, 1967-1968.

PUBLICATIONS


The design of a mediated product-development course using the PSI model. In Sherman, Ruskin and Lazar (Eds.), Personalized Instruction Today. San Francisco: San Francisco Press, 1977 (with Margaret E. Bell and John P. Dolly).


PAPERS AND SEMINARS PRESENTED

The applicability of three systematic approaches to item writing to the assessment of different types of instructional objectives. Paper presented at the AERA Annual Meeting, Boston, April 1980 (with Lorin W. Anderson).


UNPUBLISHED MANUSCRIPTS, INSTRUCTIONAL AND ASSESSMENT MATERIALS

The effects of concept and algorithm instruction on the learner's ability to solve verbal mathematics problems. Dissertation in progress. College of Education, University of South Carolina.


SELECTED CONSULTANT EXPERIENCES


Program evaluation, USOE Title IVC Project. Assisting students in acquiring minimal competencies in mathematics. Lorain, Ohio, 1980-81.


Science inquiry training for teachers. USOE Title IVC Project, St. Helena Elementary School, Beaufort, S.C., October 1975 and June-July 1976.


PROFESSIONAL AFFILIATIONS

Wendy Beard Allen

Present Address: Belle W. Baruch Marine Field Laboratory
PO Box 1630
Georgetown, SC 29440

Education

Bachelors of Science, Biology, Lehigh University, 1975

Masters of Education, Community and Occupational Programs in Education,
Coastal Carolina College of the University of South Carolina, 1980

Professional Background

1975-1978 Public Education Coordinator, The Wetlands Institute, a marine education and research center in Middle Township, NJ operated by Lehigh University

Summer 1979 Instructor, Coastal Ecology Classes for Children, Center for Non-traditional Studies, University of South Carolina

1979-1980 Teaching Associate, School of Science, Coastal Carolina College

Summer 1980 Instructor, Coastal Ecology Classes for Children, Belle W. Baruch Institute for Marine Biology and Coastal Research, University of South Carolina

June 1980-present Executive Assistant, The Belle W. Baruch Foundation

August 1980-present Director, Continuing Education Program, Belle W. Baruch Institute for Marine Biology and Coastal Research, University of South Carolina

Teaching Experience

Public Education courses for adults: Marine Ecology, Natural History of Cape May County, The Habits and Ecology of Fishes

Public Education courses for children: Coastal Ecology, grades K-12

College level: Contemporary Biology Laboratory

Lecture and Conference Participation

1975-1978 Public Lecture Series, The Wetlands Institute, coordinated the series which included twenty lectures a year

1975-1978 Presented lectures and conducted field trips for school groups, civic and other educational organizations (about 80-100 groups/year)

April 1978 Conference: "Marine Education in New Jersey", conducted workshop on "Gyotaku and the External Anatomy of Fish"
Oct. 1978 Public Information Conference: "Oil From the Outer Continental Shelf: Offshore and Onshore Implications for New Jersey", acted as conference coordinator and co-editor of the proceedings

Sept. 1980 Conducted Marine Education Workshop for teachers of children in the Gifted and Talented Program

Positions Held


1977-1978 New Jersey representative to Stateroom section of the National Marine Education Association’s newsletter, Current

1978 Council Member, Northeast Marine Education Council

1980-present South Carolina representative to Stateroom section of the National Marine Education Association’s newsletter, Current – The Journal of Marine Education

Publications


Allen, W.B. and Herman, S.S., Eds. 1980 Oil from the Outer Continental Shelf: Offshore and Onshore Implications for New Jersey, Conference proceedings, Lehigh University, Bethlehem, PA. 164 pp.


Marine Educational Brochures published by Lehigh University:

"The Mollusc and Its Home", 1973, author and illustrator of this brochure which depicts bivalves and gastropods common along the New Jersey coast

"A Salt Marsh Through the Seasons", 1979, author and illustrator. Brochure about the dynamic and productive nature of estuaries

"What Do You Know About the Diamondback Terrapin?", 1979, illustrator of this brochure written by Barbara Marsh which describes the life history of the diamondback terrapin
Appendix E

Fry's Graph for Estimating Readability